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INTERMITTENT FEVER IN THE HORSE.

BY A. G. ROLLS, M.R.C.V.S., ARUNDEL.

CASES of intermittent fever in the lower animals may be found scattered through European veterinary literature, though its existence has been denied by eminent authorities on animal diseases. Reference to the volumes of the *Veterinarian* will show that English periodical veterinary literature by no means abounds in examples.

The following case seems beyond dispute :—

On Saturday, April 1st, 1882, I was asked to visit a carriage horse belonging to a gentleman in the neighbourhood of Arundel. The stables are situated on the South Downs, and lie remarkably open and well ventilated; in fact, almost the last place one would select for the occurrence of malarial disease. The horse had some short time previously been for a fortnight at Bognor. The hay used had been grown on a hill farm, and those in charge were most positive that no hay from low-lying meadows had been used for months past.

The attendant reported that on this, as on the three previous days, the horse had been seized suddenly with violent shivering and blowing. On this day (Saturday) the attack had been more severe; he had sweated profusely, lain down, and even scraped a little with his fore feet. He had heard a sort of gurgling noise in the throat, after which the animal seemed much relieved.

I found the horse in a comfortable, roomy box, well clothed with double rugs and hood, feeling very warm; pulse 60, rather full and soft; nothing abnormal could be detected on auscultating the chest, and he was considered very much better.

The horse beginning to feed, I thought the attack probably due to gastric indigestion and tympanitis, the animal being a windsucker, and the groom positive there were palpable eructations, followed by relief. I ordered the horse to be well mashed, precautions taken against his wind-sucking, but gave no medicine.

Sunday, April 2nd.—The horse had another attack, for which he was given, to cut it short if possible, ℞ Tinct. Opii, ʒiss; Ether Rect. ʒj; Potass. Bromid, ʒj; Aqua, oj; Mix.

April 3rd, 10 o'clock a.m.—On examining the horse this morning, I found the pulse natural in number and character, but he seemed feverish, the skin feeling hotter than natural to the hand; the mouth was unpleasant, and the tongue furred; the fæces in small, hard, slimy balls.

To have the following fever mixture twice to-day:—℞ Tinct. Digitalis, ʒiv.; Antim. Potass. Tart. ʒj; Potass. Nitras, ʒij; Camphoræ, ʒj.

During the evening I was somewhat surprised by a message asking me to see the horse at once, as he had been again taken about ten minutes after receiving his evening draught—blowing and shaking, had got down, and was unable to rise. I at once rode over, and found the horse, in the opinion of the men, better. I inquired particulars of the attack, and was informed "that the horse had seemed very well all day, had fed well, and appeared doing satisfactorily, but just after receiving the second fever draught, he commenced shivering and blowing, perspired profusely, and finally went down, and would not attempt to rise; he even rolled over and pawed about." I found the horse up; there were distinct traces of sweat about him; his pulse was full, soft, and over 60 in number; visible mucous membranes injected. The animal seemed in rather an excitable nervous condition—held his head high up, and frequently threw it up and down; everted his upper lip, and unless held continually walked round the box. He would stand perfectly quiet if one of

the men pulled his ears or played with him, but when at liberty kept marching about in evident uneasiness. He frequently switched his tail up and down, placed himself in position to stale, which he did ; no retention of urine was noticed.

Gave draught No. 1. Examination after an hour's interval showed the horse to be better ; the uneasiness was much less. Before, the animal seemed unwilling to be left alone, pawing the door when the men left the box—a habit he was not guilty of when in health. Gave a second dose before leaving him, and left a man to watch him during the night.

Tuesday, April 4th.—Man reports that the horse seemed well during the remainder of the night ; pulse natural ; fæces hard, slimy, and tongue furred ; feeding well, and apparently nothing the matter. Decide to give him a mild aperient, *i.e.*, Physic ʒiv.

The ball acted the following day, and during the time the horse was under its influence no attack was noticed, but when set, on the 8th, he was seen to be again shivering and blowing.

9th.—He had a similar attack, attended with slight hæmorrhage from one nostril.

Monday, 10th.—My attention having been called to the fact of the horse having had attacks on the 8th and 9th, and having seen one attack commence, I had not the slightest doubt of its thoroughly intermittent febrile character, and I decided to place him at once on Quinæ Sulph. ʒss. twice a day. In the attack I witnessed, the horse had not long been fed, only some few minutes, and when left by the groom was to all appearance perfectly well. When I entered the box I found him shaking violently, but continuing to feed ; pulse small, rather hard, about 56, of a distinctly different character to the pulse I found when I had seen the animal just after the attacks had passed off ; it was then full, soft, and slow ; at other times the pulse was natural. The nasal mucous membrane was rather livid looking ; the mouth and skin seemed cold, and when held away from his corn, the shaking was sufficiently great to almost make his teeth chatter. There was slight nasal hæmorrhage, the blood apparently thin and dark-looking.

11th, 12th, 13th, and 14th.—Had very slight attacks, with hæmorrhage from both nostrils.

15th.—No attack.

16th.—No attack. To have one dose of Quinine about five hours before the attack generally commenced, viz., at about ten o'clock a.m. ℞ Quinæ Sulp. ʒj ; Spt. Ether Nitric, ʒiss ; and late in the evening to have Quinine, ʒss ; also to take in food, ℞ Arsenic, grs. ijss ; Ferri Sulph. ʒj. Under the influence of Quinine the pulse became intermittent, and I then gradually discontinued it, administering the arsenic and iron for some little time. The horse, which had slightly fallen away in condition, rapidly regained it, and in a month was quite fat and blooming.

My medical colleagues consider the attack to be due to impure water, large houses on the hills having to depend on rain water stored in tanks, and liable to be polluted by *débris* of various kinds.

FATAL DIARRHŒA AMONG HORSES AT CABUL, AFGHANISTAN.

BY J. A. WOODS, M.R.C.V.S., ARMY VETERINARY DEPARTMENT.

WHILE at Cabul, in 1880, twenty-eight cases of Diarrhœa occurred amongst the horses of the regiment (9th Lancers) then under my charge, during the latter part of the month of February, and the whole of the month of March, 1880, nine of which proved fatal. The duration of the disease in the cases varied from four to seventy-two hours. The stud-bred horses suffered most from the disease, as of the twenty-eight cases that came in to the sick lines, seventeen were stud-breds, one Cabulee entire horse, and ten "Walers." Six of the nine deaths were stud-breds, the remaining three were "Walers."

All the horses attacked were over eight years of age, except one, a six-years-old stud-bred. All attacked were in good condition—generally the best-conditioned horses in their troops, and in good health and spirits. There were no premonitory symptoms in any of the cases, the animals being suddenly attacked with Diarrhœa of a severe type, the evacuations, as a rule, being of a serous character, of a light-yellow, brownish-yellow, or greenish-yellow colour, and ejected about every twenty minutes with great

force. In some cases they were very fœtid, and in others almost odourless. The pulse in those cases that proved fatal was generally about 60 per minute at the commencement; but as the disease advanced, it went up to 100 or 104 before becoming imperceptible, which always happened a short time before death. In those cases that recovered, the pulse in the early stages was about 44 to 48 per minute, and rarely went beyond 70 or 80. In nearly all the cases colicky pains were present in the early stages, the pain becoming more continuous towards the end in the fatal cases. Directly a horse was attacked he was noticed standing with drooping head in the most listless attitude, with abdomen drawn up and back slightly arched, remaining in this position till the colicky pains came on, which was generally after the fæces had been passed, when he began to paw, look round to his flanks, sometimes roll—in fact, show all the symptoms of abdominal pain. There was always a great amount of fever present. In two cases I was able to take the temperature: in one it was as high as 106°, and in the other 107°; both of these cases recovered. I regret to say I was unable to take the temperature regularly, or in more than these two cases, as I had no thermometer of my own.

In all the cases, from the yellow condition of the visible mucous membranes, the liver was evidently affected; these membranes also were very much injected.

In several of the fatal cases that extended over twelve hours' duration, brain symptoms were present, the animals remaining down in a comatose condition, the head resting with the teeth on the ground, and the body being on one side. In one or two cases towards the end, the patients became delirious; the eye became glassy, and rolled in the orbit; the horse walking wildly round in a circle, neighing, and grinding the teeth, and then struggling violently, so that it was dangerous to approach him.

In those cases which recovered after the Diarrhœa had ceased, the most obstinate constipation set in, the patient often going four or five days without evacuating anything, and then only small quantities of fæculent matter came away, which was thickly covered with mucus; sometimes only mucus itself came away. Several of the cases after recovery showed symptoms of conges-

tion of the lungs, evidenced by a difficulty of breathing and a quick soft pulse. In one case the congestion rapidly ran on to inflammation of the lungs, and the patient, being already weakened by the Diarrhœa, rapidly succumbed. As a rule, the congested condition of the lungs readily yielded to treatment. Sore throat was invariably present, shown by a difficulty in swallowing. The appetite generally returned about the third or fourth day after the Diarrhœa had ceased; as a rule, the patients regained their strength rapidly, and in only two cases the disease appeared to have seriously injured the constitutions of the animals. In a few cases a suppressed and painful cough was present for a few days.

Post-mortem Appearances.—The abdominal cavity, on being opened, showed no appearances of peritoniteal inflammation. The stomach in nearly all the cases was quite full, no matter how long the case had been in the infirmary; the contents being food only slightly acted upon by the gastric fluids. The cuticular coat presented in some cases, at its junction with the villous portion, several ulcerated patches, which had completely gone through mucous and sub-mucous coats. These ulcers had ragged edges, and had generally a bright yellow tinge round the borders. In some cases several large tumours, varying in size from a pigeon's to a duck's egg, having a fibrous exterior and a cheesy interior, were found embedded in the sub-mucous portions of the villous coat. This coat (the villous) in those cases that occurred at first, presented a highly-congested and sometimes inflamed appearance; and in those that occurred later on, the mucous coat was almost completely destroyed, the destruction having taken place at times in small, and in others in large, patches, having very much the appearance as if acted upon and destroyed by some powerful irritant. I carefully examined the contents of the stomach as well as circumstances would permit, but was never able to discover anything of a poisonous nature. I had no means of applying chemical tests. The mucous coat of the small intestines was always very much congested—so much so at times that the capillaries could be seen, and gave the membrane or coat an appearance as if covered with minute black hairs; patches of inflammation were also to be found, especially towards the termi-

nation of these intestines. These patches varied from two or three inches to a foot in length. In one or two cases there was inflammation of this coat throughout its entire length. In places, the small intestines were so contracted on themselves, that their calibre was diminished to about one-fourth of their natural size; these contractions varied in length from a few inches to a couple of feet. Peyer's patches were very clearly distinguishable in many of the subjects. The mucous membrane lining the cæcum was always in a highly-inflamed state, the inflammation becoming more intense towards the blind end. In some cases this intestine contained a quantity of ingesta in almost a dry state, and adhering to the sides, and completely blocking up the end. The mucous coat of the double colon was always intensely inflamed, the inflammation sometimes extending to ulceration, and in one or two cases to gangrene. This intestine also, in some cases, presented the same contracted appearance noticed in the small intestines, the contractions, as a rule, taking place close to the curve. The double colon generally contained a quantity of fluid of a greenish or greenish-brown colour, with a very fœtid odour. The mucous coat of the single colon and rectum was always much inflamed. The liver was sometimes enlarged, but was always soft, and presented externally a yellowish-brown appearance; sometimes it was found dotted over with minute coloured spots. The spleen, as a rule, was slightly enlarged and very much congested, being filled with very dark-coloured blood. The heart was normal in appearance, but the ventricles were always filled with black fluid blood. The blood in all these cases was very dark-coloured, and showed little tendency to coagulate. The lining membrane of the air passages was congested, and the lungs themselves invariably presented a very much inflated appearance. In one or two cases the vessels of the brain were much congested.

Preventive Measures.—At first I thought the food, which at the time consisted of Indian corn as a grain ration, and boosa, by producing indigestion, was the cause of the Diarrhœa, and at once recommended an alteration to half Indian corn and half barley, a seer of bran to be given in lieu of a seer of Indian corn, when procurable, to each horse daily, and that every horse should get

too seers of dried lucerne every day, to be mixed with the boosa, which was done. I also recommended and obtained for each horse daily, to act as an alterative and stomachic, half an ounce of salt and a quarter of an ounce of black pepper, but neither this nor the alteration in the diet had any effect in checking the disease. At the same time the water was also examined, but nothing of an injurious nature could be detected in it. The men of the regiment obtained their water from the same source, a well close to the lines. I then recommended that the horses should be moved to a place about eight hundred yards off, on to a gravelly soil on the southern slope of the Bemaru Hills, which, after some time, was done, and the disease at once ceased.

Treatment.—When the disease first appeared, I tried to check the Diarrhœa with crude opium and catechu combined, a dram of each every hour, and sometimes every two hours, depending upon the severity of the Diarrhœa, but met with only indifferent success. I then tried the Tinct. Opii combined with the Spr. Ether Nit., in ounce doses, given every two hours, with tolerable success; the most successful mode of treatment I found was the Tinct. Opii and Ol. Lin., one ounce of the former to eight or twelve ounces of the latter for the first dose, and every hour or two hours afterwards one ounce of Tinct. Opii and four ounces Ol. Lin., till the Diarrhœa and pain ceased. All the cases from the first were treated with hot applications to the abdomen, and either the oil of turpentine or mustard well rubbed in. In some cases, when the abdominal pain was very severe, I gave chloroform in ounce doses, but cannot say I ever found it answer satisfactorily.

When the patients began to recover, I relieved the constipation, which was always present, with small doses of linseed oil, given three times a day, till the bowels began to act. In those cases which showed symptoms of congestion of the lungs, I found that the application of the oil of turpentine or mustard to the chest and sides, with the Ammon Bicarb. given internally, in two dram doses, soon afforded relief. When the constipation was relieved, all that was required to bring them round was good nourishing food and careful nursing.

The disease almost entirely confined itself to two troops, the

'D' and 'F,' which stood almost parallel to each other, in separate sheds, in the centre of the lines. The horses of these two troops were, at the time of the outbreak, in better condition than those of any other troop. They were fed exactly the same as the other horses of the regiment, and watered from the same well. When these two troops were moved out to the side of the Bemaru Hills, I had the flooring of the sheds in which they had been standing dug up, to a depth of one or two feet, and fresh earth put down. In digging up these floors, I found running through both of them a ditch about three or four feet deep, which had, before the shed had been built, been filled up with manure and refuse matter of all sorts, and covered over with a thin layer of earth about nine inches in thickness. On opening this ditch the effluvia that came from it was very bad, and the contents were found to be in an advanced state of decomposition. On examining the ground in the immediate vicinity of these sheds, I found two or three pits, several feet in depth, which had also been filled with up with the same materials as the ditch. These, with the ditch, I had thoroughly cleansed out, and then filled with fresh clean earth, in which was mixed a quantity of McDougall's disinfecting powder. The horses of the two troops remained out for four weeks, and were then brought back; no cases of the disease have appeared amongst them since. The floors of all the sheds are dug up to the depth of little more than a foot every month, and fresh earth put down.

I am inclined to think that the disease was a blood poisoning, caused by emanations of an injurious nature, arising from these pits and ditch, and the fact of the disease ceasing immediately the horses were removed to fresh standings, away from the effects of any emanations that might have been arising in the old, tends to confirm me in my opinion. The disease could not have been caused by the food, as all the other four troops were fed with exactly the same forage, Indian corn and boosa; neither could it have been the water, as all the horses were watered from the same well. Had the animals been poisoned by substances administered in the food or water, the probability is that the percentage of deaths would have been greater, and the cases that occurred would not, I fancy, have been so exclusively confined

to the two troops; besides which, the horses were too well looked after for any unfair advantage of that sort to be taken, unless by the Syces, which was highly improbable, as they could derive no advantage from the deaths of the animals. The 3rd Bengal Cavalry, encamped on a piece of ground adjoining our lines, had six horses attacked with this disease, three of which died. The ground on which this regiment was encamped had been occupied by the 5th Punjab Cavalry during the whole of the winter months, and had become thoroughly soiled, and had in many places a depth of a few inches of nothing else than horse droppings. This regiment was moved out to a fresh encamping ground, and no fresh cases of the disease occurred.

Mr. Mitchell, V.S., R.H.A., asked me to look at some cases of Diarrhœa which he had in his sick lines, and which had appeared amongst the horses of 'F' Battery, 'A' Brigade, R.H.A., but it in no way resembled the Diarrhœa which had broken out amongst the horses of my regiment and the 3rd Bengal Cavalry.

EXTREME OVARIAN DROPSY IN A THREE-YEAR-OLD HEIFER.

BY G. GARTSIDE MAYOR, M.R.C.V.S., KIRKHAM, LANCASHIRE.

As the following case appears to me an uncommon one, I have ventured to lay a short account of it before the readers of the VETERINARY JOURNAL.

History, etc.—On April 1st of this year, I was requested to attend an animal which had been some hours in labour, the owner stating that he "could not feel anything in the passage." On my arrival, I found the case to be one of "breech presentation" in a well-bred three-year-old heifer (*primipara*). Without much difficulty, I rectified the position of the fœtus, and effected delivery, and as the fœtal envelopes came away in a very short time, and all appeared nicely, I left the animal to the owner's care, not expecting to hear anything more of it.

Three days after, I was again summoned to see the animal, and on my arrival at the farm (a distance of six miles), I found my patient almost in a state of collapse. Pulse 100, respiration

hurried; some degree of gastric tympany, fæces scanty and semi-fluid, urine normal, lacteal secretion nearly *nil*, appetite almost gone, and rumination suspended. There was an unduly full state of the abdomen generally, which hardly seemed that of flatulence, and could scarcely be caused by food, as the animal had taken very little since she calved.

I resorted to stimulants both internally and externally. On the next day there was extreme diarrhœa, sickness, and almost total inappetence.

Despite all my efforts, these symptoms continued (with varying severity) for over a fortnight, when my patient died. Almost to the last there was extreme thirst, the animal drinking gruel and milk freely.

Post-mortem Examination.—On opening the abdomen, my first impression was that I had a case of extra-uterine fœtation; for a large mass presented itself, having more the size and appearance of a gravid uterus than anything else I could compare it to. On examination, however, I found that it was the right ovary in an enormously distended condition, and on incising it there issued a tremendous quantity of serous fluid; I should think there must have been from fifteen to twenty gallons, if not more. The small intestines and a portion of the colon were attached to the capsule of the tumour by numerous strong bands of fibrous tissue and false membrane; the intestines were highly congested. All the other viscera were quite healthy, with the exception of being anæmic.

Remarks.—What appears to me most remarkable in this case, is the enormous volume the ovary had assumed, and the fact that the animal was only three years old, since, according to all that I have read upon the subject, ovarian dropsy usually occurs in old age.

On further inquiries I found that for some months past the animal had appeared unusually quiet, and always looked "full"; but as she was a good feeder, and apparently quite healthy, no further notice was taken of her.

The explanation which offers itself to my mind, as to why the symptoms of disorder were not manifested until after parturition, is the fact that the intestines, being closely attached to the diseased

ovary, were somewhat drawn from their position by the partial descent of that body, consequent on the evacuation of the uterus; hence, a continuous irritation was kept up. Also, I suppose that the accumulation of fluid in the ovary would probably go on more rapidly after the demands of the "fœtus in utero" upon the circulatory system were stopped.

[Ovarian dropsy in so young an animal is very unusual, and its development must have been very rapid. With regard to volume, the ovarian distention in this case appears to have been extreme; but this is not unusual, as instances are recorded in which the cyst has occupied the greater part of the abdominal cavity.]

FRACTURE OF THE OSSA CALCES DURING CASTRATION.

BY A. C. ROBERTSON, M.R.C.V.S., WORCESTER.

ON the 4th inst. we were requested to visit a colt, belonging to Mr. Deakin, of Eastborough, that had injured himself while being castrated. He was a strong, muscular, healthy-looking cart-colt, about three and a half months' old. He was cast, fastened in the usual manner, and operated on, after which he was unable to rise, and kept struggling until I saw him. Upon examination, I found there was a fracture of the os calcis of both hocks, and, considering the case a hopeless one, advised the animal to be destroyed. The fracture is a separation of the epiphysis of the tuberosity of the bone, about half-way across from behind forwards, then extends into the body of the tuberosity, obliquely downwards and forwards about one and a half inches, the piece being quite detached. The fractures of both hocks were exactly alike.

The accident occurred during the operation, from the severe struggling of the colt, and made a noise, the groom told me, like the snapping of a rope, first the one, then the other.

My partner, Mr. Perrins, and self, considering the case in its relation to casting our patients for castration, especially animals so young, "which many now advocate in order to lessen our casualties," and the accident being in itself at least a novel one, thought it might be considered worthy of record in the VETERINARY JOURNAL.

ANTHRAX FEVER, OR LOODIANAH DISEASE, IN INDIA.

BY J. MILLS, M.R.C.V.S., A.V.D., INDIA.

(*Continued from page* 176.)

Exercise.—This strengthens the various organs of the body, accelerates the circulation of the blood, increases the action of the secretive organs, and promotes the carrying off of effete materials. It renders the body less susceptible to the various changes of temperature, and enables it to ward off many forms of disease.

If exercise is regular and not excessive, it tends to develop and invigorate the power of the body and limbs. Therefore, a well-regulated amount of it ought to be given, so as to make the troop horse always ready and fit for hard work whenever he is wanted to perform it.

After having referred to what I consider should be done to prevent the disease occurring, we must now see what are the best means to employ when it breaks out, so as to arrest its progress.

1st. On the appearance of the first case, lose no time in vacating the lines and getting the horses all into camp.

2nd. When leaving the stables, all the grass and litter left behind should be collected and burnt.

3rd. For the camp select a healthy situation on a portion of rising ground, a good distance from where the disease broke out, as the change must be as complete as possible.

4th. Give the horses just double the picket room that they would have under ordinary circumstances.

5th. Entirely change the forage, more especially the grass, and give, if procurable, one pound of linseed daily to each horse in addition to the ordinary diet; and above all, give plenty of salt, not less than half an ounce *per diem.*

6th. Choose a suitable site for the horse hospital, at the very least 500 yards from camp.

7th. Isolate the sick at once, with all their stable gear, together with the attendants, and prevent any intercourse taking place between these men and those in the horse lines.

8th. All food refused by patients should be burnt at once, as it might find its way to healthy animals, and it is certain to have some saliva on it, and we know that the saliva abounds with bacteria.

9th. The fæces and urine ought to be carried to a distance and buried in a deep hole.

10th. The cleanliness of the lines while out must be rigidly observed.

11th. Make a careful inspection at each meal.

12th. In the hospital, disinfectants must be freely used. Carbolic acid should be employed, as from its certain properties of destroying low animal life it will be found equally efficient in preventing as in curing the disease.

13th. The wearing of flannel nose-bags at night might be found to act beneficially, as, I believe, they were found very useful during the campaign in South Africa, in the prevention of Horse-sickness, or if a species of respirator could be constructed, one which would possess the power of being able to rid the air of its impurities in its passage to the lungs. I am certain that good would accrue from its use.

14th. After being in camp a few days, and if fresh outbreaks continue to take place, shift again, and keep doing so until the disease has disappeared.

15th. Do not return to cantonments again until you are perfectly satisfied that the outbreak has terminated, and that all the supposed causes have been removed, such as the well cleaned out, the stables disinfected and whitewashed, the floors properly relaid, etc., etc.

Disposal of the Dead.—As soon as possible after death, remove the carcase to the place of burial, which should be well away to the leeward, and at a considerable distance from the lines. Slash the skin well, and be careful to open the chest, abdomen, and bowels; if this is not done, when decomposition takes place in the grave, the body becomes distended with gas, which presses the soil upwards producing cracks, which allows the foul effluvia to escape.

The grave ought to be at least ten feet deep (the deeper the better), into the bottom of which throw ten seers (twenty lbs.) of

unslaked lime, and over the body twenty seers (forty lbs.) more, then have the earth thrown in and well rammed down.

All the line gear belonging to the dead that will burn, have it burnt, and the ironwork allowed to remain in the fire for some time. Where a patient has been standing, have the ground freely sprinkled with unslaked lime, and afterwards trench it to a depth of not less than four feet.

General Remarks.

Predisposition.—There seems to be no predisposing state for the reception of the existing cause, as it attacks animals irrespective of age, sex, caste, or condition; and although I have tried to show what class of subject (see Table No. 2) is most liable to this disease, yet I cannot say that any one more than another presents what may be termed a typical disposition.

If there is such a thing as predisposition in regard to this Fever, it will be found in animals of feeble health, or bad habit of body, worn out or exhausted from whatever cause, deprived of sufficient nourishment, or disordered by food of a bad quality, and living in low, unhealthy districts, exposed to various impurities of the atmosphere; all these tend to pervert the healthy vital functions, to introduce changes in the composition of the fluids and solids, and thereby to weaken that power of resisting noxious agencies with which the body is endowed in a state of health, thus creating a predisposition to disease; and in a country like India, where the existing profusion of malarial elements implants within the system the seeds of Fever, which originates its development in these deteriorated constitutions.

It is also to be presumed that insufficient attention to any of the rules of hygiene, wherever it might exist, would predispose the system generally to disease, and in a tropical climate especially to diseases of a febrile character. Therefore we may say that animals whose vital powers are weakened by any cause, are those most likely to become first attacked; consequently, when in such a state they are predisposed.

Whether or not some subjects enjoy comparative immunity

from such a scourge, is a question that will, I am afraid, remain unsettled, but demands profound attention.

Altitude.—I cannot say that I have heard of the disease occurring at high altitudes, although there is no reason why it should not occur in such situations, if they are rendered impure by improper sanitation; in fact, a case has come under the notice of Veterinary Surgeon Nunn, R.A., at an altitude of over 7,000 feet above the level of the sea; but this, I presume, must be the exception to the rule, as in elevated positions the prevalence of septic diseases of any description is less than in low-lying districts, and I should think the same rule is equally applicable to Anthrax Fever. Therefore we may state that no particular altitude enjoys immunity from it, but we can say with a certain amount of precision that it is very rare in such regions, as altitude is inimical to the development of many diseases, owing to the greater purity of the atmosphere, its freedom from organic matter, and the presence of ozone.

Loss.—The loss to the Government by the two outbreaks at Bareilly was, calculating the value of each horse at Rs. 500, or £43 15s, taking the rupee at 1s. 9d., exactly Rs. 5,500, or £481 5s, thus: nine horses died in 1877, Rs. 4,500; two horses died in 1878, Rs. 1,000; total, Rs. 5,500, or £481 5s. This sum, small as it may seem, would add considerably to the price of new stables.

The conclusions which I have drawn from my inquiry into this disease are:—

1st. That it is a Fever of a most malignant type.

2nd. That it is due to the presence of bacteria in the blood.

3rd. That it is a most fatal disease, death claiming on an average about one in three, a higher ratio than is afforded by almost any other curable disease.

4th. That it generally occurs after the rainy season, after the soil has been inundated, or just when the water has subsided.

5th. That one attack does not give immunity from another.

6th. That animals attacked on the second occasion suffered less than on the first.

7th. That "walers" withstand the effects of the disease badly, 80 per cent. of those attacked having died.

8th. That a case may terminate fatally in from four hours to fourteen days, that is, giving the minimum and maximum time, taken from forty-two cases.

9th. That to prevent its occurrence, sanitation in its widest application must be minutely carried out in every detail.

10th. That it is of rare occurrence in India at high altitudes.

11th. That treatment must be prompt, and entirely of an antiseptic nature.

12th. That the disease is most likely to assume an aggravated form in previously unhealthy constitutions.

13th. That in such subjects the symptoms are most obstinate, and rarely yield to treatment.

14th. That the utmost care must be taken in making *post-mortem* examinations, to prevent infection or inoculation.

15th. That the burial of the dead must be carried out with the greatest exactness, and in strict obedience to the laws of sanitation.

In conclusion, I consider that these outbreaks only tend to show the necessity there is for some remedial measures, and, if possible, to institute some means whereby to check the large mortality which this disease claims. An inquiry ought to be set on foot, so as, if possible, to find out and carefully examine the causes, and the extent to which they prevail in the various districts where the disease has shown itself. It is, however, a pleasing duty to me to narrate the successful efforts that have been made in several parts of India, to annihilate the sources of this disease, and the more useful; as they show how entirely these evils may be subjected to human control by the exercise of foresight and management, combined with the proper application of sanitary science. There are many stations in the country where the disease formerly prevailed but now is unknown, where changes for the better have been introduced.

The good care and management of the troop horse, if we want to keep him in health, must be well assured by the appointment of men able and zealous in the discharge of their duties; and I am confident that all efforts to improve his sanitary condition in India, by the building of proper stables, by laying down thorough systems of drainage, etc., may fail, may even end in a result

precisely contrary to what was intended, unless parallel endeavours are set on foot to extend a sound sanitary education to those under whose immediate care he comes. Let us also bear in mind that our duties are essentially of a preventive nature; it is, therefore, all the more incumbent upon us to devote a considerable portion of our time and our talent to the study of hygiene, and to its proper and scientific application, both in keeping up the natural standard of health, and preventing the invasion of disease.

Lastly, were many of my suggestions carried into effect, I do not doubt that the prevalence of this disease might be very much diminished. Many of the evils which I have pointed out are the inevitable results of improper sanitation, and I emphatically assert that this Fever and many other diseases are the inseparable accompaniments of bad stable management.

No. 2.—Table showing a few particulars of outbreak (R.A., 1877).

Strength of Battery at time of Outbreak.	Stud.		Waler.		Total Number Attacked.	Stud.		Waler.	
	Mares.	Geldings.	Mares.	Geldings.		Mares.	Geldings.	Mares.	Geldings.
115	24	41	13	37	26	6	15	3	2

Total Number Cured.	Stud.		Waler.		Total Number Died.	Stud.		Waler.	
	Mares.	Geldings.	Mares.	Geldings.		Mares.	Geldings.	Mares.	Geldings.
17	3	13	1	0	9	3	2	2	2

Percentage of "Caste" on Number of Admissions.	Stud.	Waler.	Percentage of Attacks on Original Strength.	Stud.		Waler.	
				Mares.	Geldings.	Mares.	Geldings.
Stud ... 21 Waler ... 5	80·7	19·2	22·6	25·0	36·5	23·0	5·4

Percentage of Deaths on Original Strength.	Stud.		Waler.		Percentage of Deaths on Number of Admissions.	Stud.		Waler.	
	Mares.	Geldings.	Mares.	Geldings.		Mares.	Geldings.	Mares.	Geldings.
7·82	12·5	4·8	15·3	5·4	34·6	50·0	13·3	66·9	100·0

Percentage of Cures on Number of Admissions.	Stud.		Waler.		Average time during which those that died were under treatment.			Average time during which those that lived were under treatment.			Average age of those that died.		Average age of those that lived.	
	Mares.	Geldings.	Mares.	Geldings.	Dys.	Hrs.	Min.	Dys.	Hrs.	Min.	Yrs.	Mths.	Yrs.	Mths.
65·4	50·0	86·6	33·3	·0	2	7	10	5	3	21	8	7	10	7

The facts adduced in the above table may serve to give an approximate estimate of the effects of this Fever on the various classes of animals attacked; but I am well aware that a more copious induction of facts, from observations made during a series of years, would be necessary to establish any positive conclusions. It, however, appears to me important to refer to this table for the purpose of ascertaining the comparative proportion of deaths that have occurred amongst the different classes of animals affected, with a view to consider how far it may be necessary to apply greater care and attention to those most susceptible to the disease; therefore I have drawn it up to enable a comparison to be made without difficulty.

Editorial.

THE EDUCATION OF VETERINARY STUDENTS.

WITHIN a few days the Veterinary Schools will be opened for the winter term of instruction, and it may not therefore be amiss to briefly consider the subject of the education of the students who enter these schools—a subject which has been frequently discussed in this journal, and one which must be of perennial interest to those whose sympathies for professional advancement are sincere and deep. For no one who knows anything at all of the requirements of a competent practitioner, can for a moment doubt that on the degree of education, both general and

technical, of those who receive the diploma of the Royal College of Veterinary Surgeons with a view to practise animal medicine and surgery, must entirely depend, not only the position they will hold in public estimation, but also the progress which must be made in their calling. The great and most beneficial change effected in the condition of veterinary medicine in these Kingdoms, by the Act of Parliament of last year, renders it absolutely necessary that the profession should do everything in its power to prove itself worthy of, and grateful for, the benefits that Act confers upon it, and the confidence the public has placed in its efforts, present and prospective, to improve this very important division of medicine and economical science. The Royal College of Veterinary Surgeons, as representing the entire body of the profession, is responsible to the public for everything relating to the education, proficiency, and professional conduct of those whom it licenses. It is therefore urgently necessary that this responsibility be recognised and acted upon, and that no cause for complaint against the Corporation should arise from any neglect in the discharge of its duties. The Royal College has already taken an important step in this direction, by insisting upon, and ensuring that those who are to receive its licence should possess a fair general education. Perhaps of all the causes which have been in operation in the past in preventing members of the Royal College from attaining that *status* which they had a claim to, none has been so potent as the defective general education rightly or wrongly attributed to them by the public. It is imperatively necessary that every candidate for the diploma shall be educated to at least a minimum uniform standard in those branches of education which will fit him to practise his profession with the greatest advantage to it, himself, and the public. Without a sufficient amount of education it is impossible that the student can beneficially pursue those studies, upon a correct appreciation and knowledge of which his future reputation and success will depend; neither can he bring anything but discredit upon his profession when he has graduated. The chief distinction between the farrier and cowleech and the graduate of the Royal College, should lie in the superior education and professional knowledge of the latter; and if the qualified and unqualified practitioners have only too often been confounded or put on the same footing by the public, this has been due to the fact that there was sometimes only too little to distinguish them from each other. If complaints have been loud and deep that hitherto we have not had justice done us, and that we have not been granted that acknowledgment which our position as members of a profession should have secured for us, we have only to inquire whether the neglect, or something worse, to which we have been subjected has not been largely, if not entirely, owing to our own indifference or supineness in this matter of general education. As a result of that inquiry, we think it will be found that—

> "The fault is not in our stars,
> But in ourselves, that we are underlings."

Without a good general education now-a-days, a profession, such as medicine, cannot be profitably studied; and if it is not profitably studied

it cannot be profitably practised. A defectively educated practitioner is of questionable value to the community, and at the best he brings only too frequently discredit upon his profession. Education was never so cheap as at present, and it is placed, by legislative enactment, within the reach of all. It is therefore incumbent upon the Royal College that it discharge one of its most pressing functions, by affording a guarantee that every one of its licentiates is at least as well educated, generally, as the great majority of non-professional people. A good education is easily carried about, and, so far from unfitting a man for being a competent veterinary surgeon, we unhesitatingly assert that without it a veterinary surgeon cannot be a scientific practitioner. It is certainly not too much to expect that every candidate for admission to the profession shall afford evidence that he possesses a good English education —such as will secure for him the confidence and respect of his clients, and enable him to assume and maintain the position accorded to the members of other professions.

With regard to professional knowledge, as has been already said, without a good education before entering a veterinary school this cannot be satisfactorily acquired. The subjects to be studied require a well-trained mind to comprehend, and this training is afforded by previous education. Besides, to the imperfectly educated student the very language of science is more or less confusing and incomprehensible, and in the brief time allowed at the schools there is not sufficient opportunity allowed to master it. Every year the study of medicine is becoming more exacting and intricate, and demands highly-trained faculties.

Without entering into the question of the subjects of study at the schools, nor the time which should be devoted to them, it may be stated that the most important—viz., anatomy, physiology, pathology, surgery, and therapeutics—should be as thoroughly acquired as possible. Without a full and exact knowledge of these, practice must always be more or less empirical and unsatisfactory. Above all things, a practical knowledge of all the subjects should be obtained. The futility of attempting to become a good practitioner by merely listening to lectures, reading books, or watching others manipulate, is too patent to be discussed here. Hence the absolute necessity for students, before graduation, acquiring, to as great an extent as possible, a notion of the practical details of their profession. This the schools cannot give, and it is only by spending some time with a good practitioner who has a varied practice that it can be obtained. Even more than the practitioner of human medicine and surgery, the veterinary surgeon needs a special practical training, in addition to the instruction he receives at the veterinary school; and the need for this training has become all the more imperative from the fact, that future graduates will be severely tested and criticised when replacing the unqualified practitioners who are extinguished by the Act of Parliament—a class of men who had to rely mainly for their success upon the use they could make of their hands.

What we sincerely wish students could acquire at the veterinary schools, in addition to a thorough knowledge of the principles of

veterinary medicine and surgery, is a durable and fervent enthusiasm for the profession they are about to enter. Without this no profession can flourish, and no progress can be made. A calling which is scarcely second to any in its usefulness, in its humane and humanizing tendencies, in its scientific importance, and in the large interests confided to it, surely merits the same enthusiasm, the same learning, and the same devotion and labour which have raised human medicine to the proud position it at present holds. The veterinary profession is now free and untrammelled, and if it is not endowed and maintained by Government, neither is it fettered and confined by Government control and dictation. It is left with ourselves to make it what we think it should be, and therefore it devolves upon us to see that we are doing all we can, by the careful training of future practitioners, to ensure our profession a brighter future than its past history foreshadowed. Success is within our reach if we will only make an effort to secure it.

ANTHRAX INOCULATION ACCORDING TO PASTEUR'S METHOD.*

BY PROFESSOR C. F. MULLER.

Being the results obtained from some experiments carried out by order of the Prussian Ministers for Agriculture.

WHEN it became known in Germany that Pasteur had so successfully prevented Anthrax, by inoculating animals with artificially cultivated virus, and that the inoculating fluid—vaccine—could be obtained from Pasteur's laboratory through M. Boutroux, 28, Rue Vauquelin, Paris, Professor Dr. Roloff, the director of the Berlin Veterinary School, sent for some to experiment with. Instead of receiving the lymph, however, he received a note stating that M. Pasteur would very much like to have the opportunity of carrying out the first experiments in Germany himself, as great care was needed for correct results, and so, if possible, prevent any untoward symptoms. M. Pasteur, therefore, voluntered to carry out the experiments for the Minister of Agriculture if he wished it. His offer was accepted, and Professor Roloff made the necessary arrangements for the work.

Professor Roloff chose a place called *Packisch*, where Anthrax had prevailed to a large extent for some time. During

1879-80,	7	horses	62	head of cattle,	and	22	sheep
1880-81,	1	„	18	„		12	„
1881-82,			4	„		52	„

succumbed to the malady.

The outbreaks were more rife when the cattle grazed on certain parts of the field, or when these parts were mown for stall-feeding. The farmer had used this field as the burial ground for those of the animals which succumbed, whilst others he put in a manure-heap, which he spread about the field. By choosing such a place as this, where we might say Anthrax had its home (indigenous), it gave a good opportunity to test the immunity given by

* Translated from the "Archiv für Wissenschaftliche und practische Thierheilkunde," Band VIII., Heft 4 and 5, p. 319. By G. A. B.

Pasteur's method against natural infection, and also to ascertain how long such protection lasted.

The animals to be experimented upon were placed in a barn (some 500 paces from the infected farm), which had not before been used to house cattle, and therefore might be considered free from the poison of Anthrax. Moreover, the wooden sides and the cement floor were well limewashed.

Twelve head of cattle and fifty sheep were obtained for the experiment; half were inoculated with Pasteur's cultivated fluid, whilst the other half remained as test animals (Controlthiere), to control the correctness of the results. The cattle were placed in the right half of the barn, whilst the sheep were placed in the left. Of the cattle, four were Bavarian working oxen, two pregnant cows (in order to test later on whether the offspring were also protected), two young cows (which had only had their first calf a few weeks previously), two young fifteen months' old bulls, which, as is known, have a great predisposition for Anthrax, and two heifers about twelve months old.

These animals had been up to March 31st, 1882, in a part of the country where Anthrax had not been seen for a long time.

The fifty sheep had also been in a similar situation up to the 31st of March, 1882. When they came to Packisch they were from two to two and a half year's old ewes.

During the experiments these animals were fed with food produced on land free from Anthrax, in order to avoid any infection taking place by eating food grown in Packisch. The cattle were fed on wheat, straw, and roots; the sheep had hay in addition to this.

The Minister for Agriculture gave out the programme for the experiments, with which M. Pasteur agreed. The members of the commission appointed to watch the process and results of the experiments were: Geheimer Ober-Regierungsrath BEYER; Geheimer Medicinalrath PROF. DR. VIRCHOW; Graf ZIETEN-SCHWERIN; Medicinalrath PROF. DR. DAMMANN, director of the Hanover Veterinary School; Amtsrath ZIMMERMAN; Oberamtmann RIMPAU; Departements-thierarzt OEMLER, who was present at all the inoculations, and Kriesthierarzt ZIEGENBEIN, during the first. Further, Medicinalrath LYDTIN was present at the first protective inoculation, and Geheimer Medicinalrath PROF. DR. LEISERING and Landesthierarzt PROF. DR. SIEDAMGROTZKY at the second protective inoculation, and at the controlling inoculations.

Shortly before the experiments commenced, Prof. Dr. Roloff became unwell; therefore, Prof. Muller undertook to be present to guide and report the results of the experiments.

The first protective inoculation was performed on April 5th, 1882, by M. Thuillier (assistant in Pasteur's laboratory).

Both the members of the Commission and M. Thuillier were convinced that the twelve head of cattle were perfectly healthy. Their internal temperatures varied from 38·2 to 38·7° C. Six of them (viz, two Bavarian working oxen, one pregnant and one milking cow, one young bull, and one heifer) were inoculated, whilst the other six remained untouched for the purpose of controlling the correctness of the experiments. Each of the twelve animals were distinguished by having the Roman figure I.—XII. branded on the hair under the right hip. Those inoculated were marked with the odd Nos. I., III., V., VII., IX., XI., whilst the controlling animals were distinguished by the even numbers.

All the fifty sheep were also considered perfectly healthy, and in fair condition. M. Thuillier thought it would be unwise to experiment with all the sheep so soon after being brought into a fresh place, and receiving different treatment and strange food; which, as is well known, frequently has a tendency to produce derangement in the system, and so cause mis-

takes. Therefore, only thirty of the fifty sheep purchased specially for the experiment were used, and twenty others were taken from a flock in the neighbourhood.

M. Thuillier considers that all sheep whose internal temperature is 39·5°C. or over, are not fit to be inoculated. The temperature of the twenty-five chosen for inoculation varied between 38·3°C. and 38·4°C. These were numbered with black paint 1 to 25. The fifteen from those purchased specially being 1 to 15, whilst the ten from those obtained in the neighbourhood were numbered 16 to 25. The remaining twenty-five animals, which were left to control the correctness of the results, were numbered 26 to 40 and 41 to 50 respectively.

The twenty-five animals that were inoculated were placed in a separate compartment, and had no communication with the twenty-five animals used to control the experiments.

The primary vaccine fluid, as it is called, or that which was used to inoculate the sheep, was preserved in glass tubes the shape of an ordinary test-tube, with the top or open end drawn out to half the diameter of the tube itself, and plugged with a caoutchouc cork. The inoculation was performed by means of a small subcutaneous injection syringe, holding about 1 ccm. of fluid. The operation was performed just outside the building where they were kept. Each sheep was placed in the sitting posture, the fore limbs being firmly held by an assistant, with the abdomen of the sheep facing the operator. M. Thuillier injected about $\frac{1}{2}$ ccm. of the inoculating fluid into the subcutaneous tissue of the inner side of the right thigh. The time occupied in inoculating the twenty-five animals was about a quarter of an hour.

The cattle which were marked with the odd figures were operated upon whilst standing—each animal received about $\frac{1}{2}$ ccm. of the cultivated fluid under the skin, behind the left shoulder-blade. The twelve animals were then housed in the following order—between two control animals was placed one that had been inoculated.

After this first inoculation, no sign of disturbance was noticed, either in the general health, internal temperature, or locality at the seat of inoculation.

The second protective inoculation with the "secondary vaccine," or that which is a little stronger, took place on April 19th, 1882, after the Commission had satisfied themselves that the animals were perfectly well. The operation was conducted in the same manner, except that the left thigh of the sheep and the right shoulder of the cattle were the points selected.

April 20th. All the inoculated animals showed a rise of the internal temperature of 1 to 1·5°, and one sheep registered 2° higher. Several of them appeared dull. Some of the cattle were swollen hard and tender at the point of inoculation, and the thighs of six of the sheep were slightly swollen and of a bluish-red colour.

April 21st. Several of the animals were unwilling to move, liked to lie down, and ruminated little. The internal temperature had fallen in the cattle and the sheep 1 to 15°, whereas that of the sheep numbered 16 to 25 was higher. The sheep numbered 20 ate and moved tolerably lively about the stall at 1.30 p.m.; at two o'clock it was breathing heavily, and died in half-an-hour. As soon as the animal was dead the blood from the vena saphena of the right hind-leg was examined microscopically, and it was found to contain a great number of Anthrax Bacilli, and the *post-mortem* demonstrated, without doubt, that the sheep died of Anthrax.

April 22nd. The temperature of the cattle and the sheep (3 to 17) was normal; the remaining sheep ranged between 41·1° to 41·8°, and they lay down persistently. All the animals fed well.

April 23rd. The above-mentioned changes at the seat of inoculation in most of the cattle were very much reduced, while those in the sheep had

nearly disappeared. Ox No. 3, however, was rather stupid in the head, and showed great dulness, and at the elbow there was an œdematous painful swelling. Sheep Nos. 2, 7, and 24 were dull, moved lazily and breathed quickly, although the appetite appeared good. Some blood was taken for microscopical examination from the ears of these animals, but no *Bacilli* could be discovered. On the other hand, sheep No. 18 had a high temperature (41·9°), conjunctiva very red, quick and laboured breathing, complete loss of appetite, foaming at the mouth, and lying down. The blood from the ear was microscopically examined at three and five o'clock, and found to contain Anthrax *Bacilli*. The animal died soon after five, and the *post-mortem* showed positively that the sheep had died of Anthrax.

April 24th. Ox No. 3 had quite lost its appetite, was exceedingly dull, and lame of the right fore limb. The swelling on the right elbow had increased in size, and was proceeding under the breast. The sheep Nos. 7 and 24 were much the same as yesterday, whilst No. 2 was somewhat livelier. The blood from these animals showed no signs of *Bacillus Anthracis*.

April 25th. The sheep No. 24 had a high temperature (42·1°C), refused its food, lay down continuously, and could only be made to rise with difficulty; when made to move it reeled with the hind extremities. The conjunctiva was of a light-red colour and highly injected. About ten o'clock heavy breathing set in, and an hour later the animal died.

Sheep No. 7 had diarrhœa, the fæces being covered by a shining gelatinous, frequently red-coloured coating, which chiefly consisted of swollen epithelial cells. The animal remained in the recumbent position, only rising to feed, ruminated slowly, and ate very little food; when pressure was applied to the abdomen the animal grunted, and showed signs of pain.

Ox No. 3 ate better; the swelling in the elbow was hard and painful, little or no weight being borne by the limb.

April 26th. The autopsy of sheep No. 24 presented all the characteristics of Anthrax, the blood teeming with *Bacillus Anthracis*.

Ox No. 3 had completely recovered, with the exception of the swelling on the right elbow and œdema of the inner side of the fore-arm of the same limb. This swelling had quite disappeared by the 29th.

Sheep No. 7 gradually improved from this day, and on the 28th was considered as quite well.

From the foregoing, we find several of the cattle and sheep became very unwell after the second inoculation, and that the sheep Nos. 20, 18, *and* 24, *died from inoculated Anthrax on the second, fourth, and fifth days respectively.*

Further, it is noticeable that the sheep (Nos. 16 to 25) which were purchased in the neighbourhood (Packisch), were those mostly affected, for the three animals that died belonged to that flock.

A yearling and a lamb, which had showed no signs of the disease, were inoculated with the blood taken from sheep Nos. 18 and 24, twenty and twenty-six hours after their death. No Bacilli could be detected in their blood at the time of the inoculation.

In order to procure the requisite material to control these experiments, a sheep was inoculated on May 3rd at the Berlin Veterinary School, with virulent fluid sent by M. Pasteur from Paris. The sheep died in about thirty-six hours of Anthrax, the blood being microscopically examined. From this animal M. Thuillier collected some blood from the right side of the heart in glass tubes, about 1 cm. wide and 25 cm. long, and sealed one end up by drawing it out to a fine point; in the other he placed a pledget of wadding. Before he filled these tubes, however, he heated them to 220°C., in order to destroy any germs they might contain. In this way he transported the blood to Packisch.

On May 6th, 1882, M. Thuillier, Departements-thierarzt Oemler, and Prof. Müller visited Packisch, and convinced themselves that the twelve head of cattle and the forty-seven sheep were perfectly healthy (after the death of the sheep Nos. 18, 20, and 24), and that the numbers which distinguished them were plainly visible. Those sheep numbered 1 to 15, and 26 to 40 were in better condition than on April 5th ; whilst Nos. 16 to 25 and 41 to 50 had gone back in condition. The blood which M. Thuillier brought from Berlin was diluted with an equal quantity of water (which, however, he boiled and allowed to gradually cool, before he mixed it), and with this fluid he inoculated these animals. Each sheep received 0·1 cm. under the skin on the inner surface of the left hind limb, and the cattle ·25 cm. in the subcutaneous tissue of the right shoulder. The inoculation was performed alternately on an animal which had been previously protected, and on one which had not been so protectively inoculated (control-animal).

Those animals which had been previously inoculated with the protective material remained perfectly well.

Their appetite remained good. At the seat of inoculation a hard nodule formed, about the size of a hazel-nut. This, however, had all disappeared again by May 14th.

May 7th. The control-animals, Nos. 6, 8, and 10, showed signs of dulness in the afternoon, and refused their food. The internal temperature of No. 2 was 38·2°C., the others varied between 40·5° and 41·3°.

On May 8th No. 12 showed no signs of illness, although the others moved languidly and lay down more than usual. The muzzles were hot, and the extremities were sometimes hot and at other times icy cold, the respiration was quickened and laboured, rumination was performed slowly, and long intervals elapsed between each.

No. 10 refused all food, but the others ate small quantities. The internal temperatures were taken at 4 p.m., and ranged from 38·5° to 40·7° C. The hair of the poorest was rough and dull. Nos. 4 and 6 had diarrhœa. No. 10 had constipation. No Bacilli could be detected in their blood.

The heifer No. 10 died during the night from May 8th-9th, being about fifty-eight hours after inoculation with the Anthrax blood.

May 9th. The pregnant cow, No. 6, refused all food this morning, and stood away from the crib, with the head sunk, and passed a small quantity of watery fæces with much straining; breathing 44 per minute, weak and languid. Muzzle hot and dry. Extremities icy cold. Visible mucous membranes very red. Occasionally twitching of the muscles of the hips and shoulders was seen. At 7.30 a.m. the pulse was 90 per minute, small, and weak ; the internal temperature 41·3° C. Bacilli could not be detected in the blood. At 10 a.m. the cow began to reel about and breathe heavily, and died sixty-eight hours after the inoculation with Anthrax blood. Directly after death a frothy bloody fluid ran from both nostrils, and the fæces which were expelled by the *rigor mortis* were mixed with blood. Ox No. 2 presented similar symptoms, and died in strong convulsions at 4.30 p.m., seventy-four hours after being inoculated. Its blood was examined at 10 a.m., but no signs of *Bacillis Anthracis* could be discovered.

The bloody frothy fluid from the nostrils and the mucus from the rectum were examined directly after death, and found to be teeming with Bacilli.

Nos. 4, 8, and 12 were not so lively as usual, nor did they eat very well. At 10 o'clock the internal temperature was 38·9° to 39·4° C. The seat of inoculation in the cow No. 8 was swollen and œdematous.

May 10th. Nos. 4 and 8 refused all food, were continually down, and showed great weakness. After much straining some small, hard, black fæces were passed. The poorest animal, whose hair was rough and dull, stood with arched back, frequently grinding its teeth, and trembled all over.

Internal temperature 41·4° and 39·2° C. The extremities were alternately hot and cold, and the visible mucous membranes highly injected. The places of inoculation were œdematous and swollen, the latter extending in No. 8 as far as the knee. The blood showed no signs of Bacilli.

The bull No. 12 appeared to be well, although the coat was rough and dull, and the animal stood with arched back ; internal temperature 38·3° C.

May 11th. Nos. 4 and 8 were better, in so far that they looked brighter about the eye, took a little food, and ruminated. Their internal temperature was 40·5° and 39·3° respectively.

May 12th. Nos. 4 and 8 still improving; they ate well and ruminated freely. Fæces natural, but small in quantity.

May 14th. Quite healthy again, except that the swelling in the cow's (No. 8) shoulder increases, is very painful, and she can scarcely move the limb. No Bacilli could be seen in the blood taken from the swelling. The swelling had not completely disappeared on June 1st, 1882, and was somewhat painful.

The controlling sheep, Nos. 26 to 50, commenced on the morning of May 7th to move slowly and lazily, to lie about, to eat less food and ruminate less frequently, and altogether to show signs of general ill-health. The first sheep died twenty-one hours after the inoculation ; and the deaths followed so quickly that in the evening of May 7th, twenty-one to thirty-four hours after the inoculation, sixteen sheep had died of inoculated Anthrax.

May 8th. (Thirty-five to fifty-three hours.) Eight sheep died, and the only one left (viz., No. 35) although very ill remained alive until the night of May 9th-10th, *i.e.*, eighty-four hours after it was inoculated. Both the blood and the mucus from the nostrils were found teeming with *Bacillus Anthracis*. The sheep generally died in convulsions, whereby a bloody fluid was forced from the nose, red-coloured urine from the bladder, and from some of them a blood-coloured fluid came from the anus during the *rigor mortis*.

The *post-mortem* examination of three of the cattle and several of the sheep was carried out by Oemler, in the presence of several of the members of the Commission, and proved that they died of Anthrax.

The blood contained enormous quantities of *Bacillus Anthracis*. The blood, taken from the spleen and navel cord of the fœtus out of cow No. 6, did not contain any Bacilli.

These experiments demonstrate that Pasteur's protective inoculation gives the animals so inoculated complete immunity against Anthrax. On the other hand, they furnish us with no satisfactory results respecting its practical utility and use from an economical point of view, since three of the sheep (or twelve per cent.) died of Anthrax, the effects of the protective material.

MM. Pasteur and Thuillier, however, remarked that such a large percentage of deaths is not usual, and it was very remarkable ; for a large number of sheep have been inoculated in France with the same kind of material, without any being seriously ill, or dying. M. Pasteur was of the opinion, that the race or breed of the animals must have something to do with these losses, and he wished to have an opportunity of testing it. The Minister for Agriculture fell in with his view, and put the whole herd of sheep in Packisch at his disposal, in order that he might make further experiments and find out to what extent the sheep were protected by inoculation from the influences which were so rife in producing the frequent outbreaks of Anthrax in that district. To obtain this end, both the inoculated and non-inoculated sheep were placed during the summer and autumn in the pastures where Anthrax had been most frequent. In order to prevent infection taking place before complete immunity had been given by the action of the protective inoculation, the whole flock was taken to a district free from Anthrax (Bor-

schütz), there inoculated, and brought back to Packisch at the end of fourteen days.

The flock consisted of 256 ewes, varying from three to seven years old, and 226 lambs, born during March and April, 1882. They were taken to Borschütz on May 6th, and on May 10th they were divided into two lots. The one consisted of 128 ewes and 123 lambs, the other 128 ewes and 103 lambs. The latter half were marked by punching a round hole through the right ear, and were left uninoculated, whilst the first half (viz., the 128 ewes and 123 lambs) were inoculated with Pasteur's cultivated protective fluid.

M. Thuillier inoculated them by injecting $\frac{1}{2}$ ccm. of the (*premier vaccin*) fluid under the skin of the inner surface of the right thigh.

It was impossible to take the temperature of 251 sheep every day, therefore fifteen sheep and fifteen lambs were set apart for that purpose; besides, the temperatures of those which showed evident signs of illness were also measured.

None of the animals presented any signs of illness from May 10th to 20th, and only in exceptional cases did the thermometer register 40·0°C. to 40·4°C. As a rule it was 38°C. to 39°C., and in a few cases it sank to 37·5°C., and often rose to 39·4° C. to 39·8° C. No changes were noticed at the points of inoculation.

On May 20th, 1882, the *second* protective inoculation took place (with the *deuxième vaccin*), after the members of the Commission had convinced themselves that the 128 sheep and 123 lambs were healthy. The operation was performed in the *left* thigh, and 0·1 ccm. of the fluid was injected in each case.

When the operation was finished, it was found that 129 ewes were inoculated, the extra one being one of the uninoculated half of the flock, that had jumped over the partition. This animal was, therefore, inoculated with the more virulent fluid (*deuxième vaccin*), and we will distinguish this animal as No. 129.

Most of the sheep presented evident symptoms of general disturbance the next day (May 23rd). They walked lazily, appeared dull, lay down, respiration quicker, and allowed themselves to be handled much more readily than those which were not inoculated. The temperature was in a great number of cases raised, and in several cases on May 23rd, 24th, and 25th reached 40° C. and 41° C. No change was observed in the appetite and rumination. In a few days several of them showed a small, hard, painless nodule, the size of a small hazel nut, at the seat of inoculation. The sheep No. 129 was ill the day after it was inoculated. On May 22nd the temperature was 41·3° C., and on the 23rd 41·4°C.

May 26th. All appearance of ill-health had disappeared in all the inoculated animals.

At 11 a.m. on May 27th, one of the inoculated ewes suddenly died, although no signs of disturbance was detected at 8.30, when the herd was driven out. Soon after death a bloody frothy fluid exuded from the nostrils, and Oemler found by *post-mortem* examination that the animal died from inoculated Anthrax.

On May 30th a test experiment was performed in Packisch with twelve ewes and twelve lambs from the herd which were inoculated on May 10th and 20th; also with six ewes and six lambs from the uninoculated half of the flock. One-half was inoculated with the blood (mentioned above) obtained from the sheep at the Berlin School, which died on May 29th, after being inoculated with some virulent fluid from Pasteur's laboratory; the other half were inoculated with the virulent fluid which gave Anthrax to the sheep at the Berlin School. Both these lots were marked, so as to be easily distinguished.

M. Thuillier diluted the blood from the sheep with water, the same as when he used it on May 6th.

Two of the sheep which had been inoculated before were operated upon, and then one of the control-animals, by injecting 0·1 ccm. of the fluid into the subcutaneous tissue of the inner surface of the left hind-leg.

M. Thuillier also inoculated three head of cattle, Nos. 4, 8, and 12 (which had recovered from their illness the result of the inoculation of May 6th) with the virulent fluid from Pasteur's laboratory. Each received about 0·2 ccm. of the fluid under the skin of the left side of the neck. No signs of ill-health followed, nor were there any local lesions to be seen, showing that the previous inoculation had completely protected them against the disease.

All the above-mentioned *control*-sheep (viz, the six ewes and six lambs) died from inoculated Anthrax. Nine died on May 31st, twenty-five to thirty hours after the operation, and three died during the night of May 31st and June 1st. The symptoms, *post-mortem* appearances, and microscopical characters of the blood were exactly the same as described above in those that died from the first experiments. No difference was observed in the time which elapsed between inoculation and death in those inoculated with Anthrax blood and those inoculated with Pasteur's virulent fluid.

The twenty-four sheep which had been previously protected against the disease, presented on May 31st and June 1st no symptoms of illness, nor any changes at the seat of inoculation, although the internal temperature in some cases was high—as a rule, about 41·5°, but one sheep registered 42·4° C. However, one lamb died on June 1st, forty-eight hours after the inoculation, without showing any previous signs of disease; the temperature on that morning was 39·4° C. The *post-mortem* was carried out at once, and revealed unmistakable Anthrax.

The remaining twenty-three sheep were apparently well during the next few days, with the exception of a lamb, which was in bad condition and weak. On June 12th another lamb died, which had shown signs of slight deviation from health since the day it was inoculated (May 30th). The *post-mortem* examination gave similar results to the last mentioned. Oemler, therefore, declared that the lamb died of Anthrax from the effects of inoculation fourteen days after it was performed.

Several of the sheep presented a painless, hard nodule—about the size of a hazel-nut—at the seat of inoculation, which had not quite disappeared by the middle of June. Oemler, moreover, was convinced that several of them (especially the lambs) had gone back in their condition since the inoculation took place.

On May 20th and 21st, according to the wish of Amtsrathes Lücke, the following were inoculated at his own risk :—

At Borschütz, twenty-six working oxen of the Bavarian breed, some of which had been there for some time, whilst the others were freshly purchased.

At Schweditz, twenty-six head of young cattle, most of them a little over one year old (twenty-four being females and two males).

At Packisch, one bull and sixteen working oxen, which had been a long time on the same farm.

All these animals were inoculated by injecting ·2 ccm. of the weakest (*premier vaccin*) cultivated fluid, under the skin of the right side of the neck. This part of the body was selected instead of the shoulder, in order to prevent any lameness resulting from the swelling which sometimes occurs at the seat of inoculation.

None of the seventy-eight head showed any signs of disturbance, except a slight rise of temperature the day after the inoculation took place, and no changes occurred in the neck.

On May 30th and 31st the second inoculation was performed with the stronger (*deuxième vaccin*) cultivated fluid. Departementsthierarzt Oemler, assisted by M. Thuillier, injected the fluid under the skin of the left shoulder of the bull and on the left side of the neck of the other seventy-seven head, exactly the same as on May 20th and 21st.

On June 1st and 2nd and following days, most of the animals lay down a great deal, and some refused their food and appeared dull. The internal temperature, as a rule, had risen to 40·0° C. or 40·8° C. Several nodules had formed at the points of inoculation. In a few days these symptoms had again disappeared. The swelling on the shoulder of the bull remained the longest, and reached as far down as the arm. On June 12th Oemler found all the animals had gone back in condition.

The fifty-two head of cattle which were inoculated at Borschütz and Schweditz, as well as the sheep, were brought to Packisch on June 8th, 1882. The non-inoculated portion of the flock did not return to Packisch until the end of July.

We will now endeavour to point out the inferences that may be drawn from the results of both these sets of experiments.

1. Cattle which withstand inoculation with the cultivated material, do not contract the natural form of the malady.

2. The weakest cultivated fluid (*premier vaccin*) did not produce any signs of disease, either in the cattle or sheep.

3. The second inoculation with the more virulent cultivated material (*deuxième vaccin*) produced a decided rise of the internal temperature and illness, although it was not, as a rule, fatal. At the seat of inoculation various-sized nodules or swellings formed, which were either painful or painless.

None of the cattle died after the second inoculation; but three sheep died out of the twenty-five used for the first experiment, and one of the 251 sheep used for the second experiment.

4. The controlling experiments with the blood of an animal that had died of Anthrax, and with the virulent fluid from Pasteur's laboratory, produced only a slight disturbance in the cattle and sheep that had been previously protected by the cultivated fluids; but those animals that had not been so protected became very ill indeed. Out of the twenty-five sheep in the first experiment, which had been inoculated with the protective cultivated fluid, none died; of the twenty-four in the second experiment, two lambs died. One succumbed fourteen days after inoculation, but both were very weakly animals, which may, to a great extent, account for this unfavourable result.

Is Pasteur's method advantageous and to be recommended? and how far may we consider it so? Before these questions can be answered, it must be first ascertained how long this immunity lasts.

No opportunities have yet been given for fixing the duration of immunity, because it is only during this year that the method has been practically carried out on any large number of animals. Up to the present time, the only knowledge we possess is, that sheep which had been protected seven months before, showed complete immunity against inoculation with Anthrax blood, but this immunity did not extend to the lambs which were born soon after the protective inoculation was performed upon the ewes. M. Thuillier says experience has demonstrated in France that the protection lasts at least for nine months.

The above experiments at Packisch will be valuable assistance in solving this question. As is observed above, Anthrax is always prevalent in that district; the place is quite isolated, and contains only cattle which have been protected by Pasteur's method, and sheep, half of which are protected, the other half not being inoculated. The great losses the farmers have had at

Packisch from this malady have made them take the greatest care to put in force any measures by which it could be checked. Places where animals that had died of Anthrax were buried were carefully guarded. The animals which were stall-fed received boiled or cooked food, and those animals which were used for working purposes wore muzzles to prevent them feeding on the field where they were working. Now, all these precautions are discontinued, and both the inoculated and uninoculated sheep are turned out in the field which had the reputation of being the most deadly pasture, and those places where bodies had been buried are no longer guarded. If they are exposed in this way during the present and next year, it will be the means of ascertaining how far they are protected from the local infectious influences, and also how long such immunity lasts. Besides this, an animal will from time to time be inoculated with Anthrax blood, to see whether it has become susceptible to the poison.

For the present, it may be said that on large farms, where Anthrax is continually present, it would be economical and advantageous to inoculate them with the protective cultivated fluid, especially the cattle, for it is not so dangerous to them as to sheep, and their loss is of most importance to the farmer. It is to be hoped that improved methods will soon be discovered, and that inoculating sheep will be attended with fewer deaths.

The protective inoculation is so very simple that no practical veterinary surgeon would find any difficulty in carrying it out; but it requires care in handling the fluid and the syringe used for the purpose, directions for which accompany the fluid sent by M. Boutroux. These set forth that the syringe, etc., should be perfectly clean when the fluid is injected under the skin; for, if any dust, or water which had not been boiled, is introduced with the cultivated fluid, other diseases might be produced, such as Septicæmia; at any rate, the results of the experiments might be questioned. The fluid should be kept as cool as possible until it is required for use, and should be used as soon as convenient after the tube is opened—at least, on the same day. The syringe should always be filled, so that no air bubbles are present, and it should be disinfected after being used. M. Thuillier, when carrying out the experiments at Packisch, was very particular in having a new syringe, or one freshly prepared, etc., after each set of experiments.

TUBERCULAR PARASITISM IN THE DOG, AND THE PATHOLOGY OF FOLLICULAR TUBERCULOSIS.

In the *Recueil de Médicine Vétérinaire* for July, the director of that journal, M. Bouley, in publishing some "notes" presented to the Académie des Sciences on Tubercular Parasitism, remarks, that there are *spontaneous* facts which, understood and interpreted, are superior, by reason of the conditions of *complete independence* in which they are produced, to those afforded by experimentation, for the solution of biological problems. What is Tuberculosis? What is the cause of the formation, in certain tissues, of those small disseminated nodules which stud them, and substitute their indurated substance for that of the organ itself? With regard to this matter, the presentiment has long been entertained, that these abnormal formations might be the indication of local irritation at each of the points where they were observed; and in order to imitate nature, foreign substances in a state of fine powder have been injected into the circulation, in the expectation that the particles arrested in the minute capillaries might play the part of the *irritating thorn*, the material existence of which was to be conceded as a condition favourable to the formation of the tubercles. In fact, in

a certain number of these attempts the results obtained confirmed the inductions which had previously arrived at with regard to tubercle being an inflammatory lesion, depending on a local irritant action. These inductions have now become an established truth, the demonstration of which is given more clearly by *natural* facts than by those of experimentation. Those published by Professor Koch, of Berlin, are very demonstrative in this respect. The *irritating thorn*, which for a long time had only been a metaphor, or at least a hypothesis, has been detected by him; it is a bacterium, which he has been able to cultivate, and the real action of which he has been able to demonstrate by inoculations that have been followed by the *systematic* formation of tubercles in the organs inoculated.

A very fine observation made by Professor Laulanie, of the Toulouse Veterinary School, as a proof of another kind in support of the idea that the tubercular lesion in itself is only the expression of a local irritation, the agents giving rise to which may be diverse without the lesion being different. In Koch's observations, the *irritating thorn* is represented by a bacterium, which constitutes one of the forms—the specific one—of Tuberculosis; in the observation of Laulanie, the *thorn* is quite different—it is an ovum, or the embryo of a nematoid worm, the *Strongylus vasorum* of Baillet, around which is formed the indurated nodule that has been named a *tubercle*. "The ova, or embryo, arrested in the fine arterioles become," says Laulanie, "the point of departure of a nodular arteritis, combining in its structure the characters assigned, since the time of Kœster, to the elementary follicles of Tuberculosis. There is found, in fact, in the centre of each nodule an ovum, or an embryo, fixed in the giant cell. The latter is surrounded by a coronet of epitheloid cells, more or less abundant, and an external embryonic zone, which frequently tends to a fibrous formation."

Laulanie has been led by this fact, which he has closely examined, of the spontaneous, but nevertheless artificial reproduction of follicular Tuberculosis under the morbid influence of the ova of a nematoid worm, to a conclusion already arrived at by others—that is, the negation of the "*anatomical specificity of tubercle*."

The following is the very interesting note on this subject, which Laulanie communicated to the Académie of Sciences, at its sitting on January the 2nd, 1882.

"I have recently had occasion to observe, in the lungs of a dog, the alterations produced by the ova of a nematoid worm, the *Strongylus vasorum* (Baillet), the identity of which with those of Tuberculosis appears to me to be of great interest. But before adducing the facts which are the principal object of this note, it is, I believe, indispensable to trace, in a few words, the principal phases in the migrations of the strongle of blood-vessels, so far as they are known, or at least so far as it is possible to infer from my observations.

"The strongles of blood-vessels live, *in the adult state*, in the right ventricle of the heart, and the larger divisions of the pulmonary artery in the dog, where they are found in more or less voluminous clusters, male and female. These masses infallibly give rise, at the part where they are located, to an endo-arteritis, the exudate of which assumes the form of cords or anastomosing layers, which maintain the parasite cluster *in situ*, and prevent it being dislodged by the blood current. It is in these central parts of the pulmonary circulation that the strongles couple, and the fecundated ova, as they are expelled from the female worm, are carried into the finest and most distant ramifications of the artery which contains the adult entozoa, and there they undergo the various phases of their development. The embryos are hatched in the interior of the arterioles or capillaries, and soon emigrate to the smallest-sized bronchi, where they are found in great numbers.

in sections of lung tissue, examined under the microscope. The presence of embryos in the bronchi (though they have not yet been discovered there), leads to the supposition that they are expelled from the respiratory passages, to be afterwards received into the digestive apparatus of another dog. The lungs, the vessels of which are filled with strongles, are studded with small, grey, semi-transparent, salient granules, which give a pearly or nodulated aspect to a section, and from their physical characters and great number realise all the appearances of *Granulie* (Granular Phthisis). There is, nevertheless, an important peculiarity, relative to the localisation of the parasitic granulations, which accumulate at the base of the pulmonary lobes, and become more and more rare towards the apices, where they almost completely disappear. This localisation, which is the inverse of the lesions of Tuberculosis, added to the well-known immunity from Phthisis of the canine species, suffices to prevent confusion.

"I have attentively studied the histological characters of this false Tuberculosis, until now unrecognised, and the conclusions at which I have arrived naturally pertain to the discussion now going on with regard to the anatomical specificity of tubercle and its pathogenesis. But I shall confine my observations to the more general facts, and to the conclusions which naturally arise from them.

"The ova or embryos arrested in the fine arterioles, become the starting point of a *nodular arteritis, combining in its structure all the characters which, since the days of Kœster, have been assigned to the elementary follicles of Tuberculosis.* There is found, in fact, in the centre of each nodular mass *an ovum or an embryo imbedded in a giant cell.* The latter is surrounded by a more or less abundant circle of epitheloid cells, as well as an external embryonic zone, which frequently tends to become fibrous.

"The details just referred to, with respect to the *habitat* of the strongles and the different phases of their development, are sufficient to demonstrate that the cellular group, formed by the giant cell and its surrounding ring of epitheloid cells, have an intravascular origin, and proceed from the endothelium of the obliterated vessel. But we may, on the other hand, frequently enough perceive the continuity of the latter with the follicle, and note that its lumen is suddenly increased where the giant cell is found; it is even possible to see the preliminary alterations which lead to the formation of the follicle. At a certain distance from the latter, the vascular endothelium is hypertrophied, and its elements project into the interior of the vessel; while in the vicinity of the follicles they proliferate, and form a column of epitheloid cells, in continuity with those which envelop the giant cell. Consequently, we have undoubtedly a nodular arteritis possessing the structure of the elementary follicle which Kiener described, some time ago, under the names of *tuberculous miliary aneurism*, or *ensheathing nodule.**

"I may add that the preceding phenomena, occurring most ordinarily in vessels close to each other, form composite nodules which have the most striking analogy to the tubercular *plexiform angioma* of the same author, if their development had taken place around vessels of new formation.

"Certainly, the vascular theory of the follicle is based on a sufficiently imposing *ensemble* of researches to ensure its being definitely accepted; and the facts of which I now present a summary analysis seem to me to be less a supplemental demonstration than indirect testimony in a new form, related to the experiments of M. Hippolyte Martin on Experimental Tuberculosis.†

* De la tuberculose dans les séreuses, chez l'homme et les animaux inoculés; par M. Kiener. "Archives de Physiologie" (Nos. 5 et 6); 1880.

† Tuberculose des séreuses et du poumon. *Pseudo tuberculose experimentale*, par M. Hippolyte Martin. "Brochure de Physiologie," No. 1, 1880.

The spontaneous, but nevertheless artificial reproduction of the tubercular follicle, under the common influence of the ova of a nematode, leads us again to a conclusion already arrived at otherwise—*i.e.*, the negation of the anatomical specificity of tubercle. It therefore appears to me legitimate to conclude :—

"1. That the specific agent of Tuberculosis acts in the same manner as the ova of the strongles, and its initial action is brought to bear upon the vessels in which it circulates.

"2. That the tubercular follicle is nothing more than a nodular vascularity.

"3. That it is destitute of anatomical specificity.

"In a future note I shall offer a certain number of facts tending to establish the mode of development, and the signification of the giant cells."

The note of Laulanie drew from Professor Colin, of the Alfort Veterinary School, another note, read at the meeting of the Académie de Médecine, on April 11th, claiming priority as to the parasitic nature of these pulmonary nodules. He points out that so long ago as 1866 he had described the tuberculous affections of the sheep and cat as due to the embryo of strongles or filaria in the lungs, and that all the facts he had observed since that time had led him to consider the tubercle of Verminous Phthisis as a product of the irritation produced in the pulmonary tissue by helminths. On April 25th Laulanie replied to Colin's *revindication*, pointing out that, in making known the histological characters of the pseudo-tubercles produced in the dog by the *Strongylus vasorum*, he showed that this nematoid resides in the right side of the heart and the large divisions of the pulmonary artery of that animal, and not in the bronchi of the sheep and cat, like the nematoid described by Colin, the lesions he had described deriving all their interest from the particular *habitat* of the strongle, whose ova are detained in the arterioles, and there produce the nodules of Arteritis, a certain number of which offer the characters of the elementary follicles of Tuberculosis.

Between the facts observed by M. Colin and those reported by M. Loulanie, observes Professor Bouley, there is this common character, that the pulmonary lesions—apparently tubercular—are due in both cases to the irritant action of nematoid worms, which play the part of foreign bodies at the points where they are arrested, determining around them the inflammatory process which was manifested by the tuberculous nodosity. But what gives the observation of Laulanie a character of originality, which distinguishes it from that of Colin, is that in the first the etiologic condition of the formation of pulmonary nodositis—in appearance tubercular proceeds from the blood—*i.e.*, the internal medium, and not in the external medium, as in the cases observed by Colin. So far as the interpretation of the phenomena of true Phthisis is concerned, it possesses a very interesting peculiarity, which gives a key to the evolution of the natural phenomena. It being demonstrated by direct observation that in a well-marked case the tubercular nodosity owes its formation to the intra-arterial foreign body while the ova of the strongle really is within the vessel, the significance of this nodosity can readily be understood, and we are logically led to consider it as the expression of a local irritation, proceeding from an agent held in suspension in the internal medium. And the recent researches of Professor Koch, of Berlin, seem to have determined this agent, which is a bacterium that acts as an irritating thorn, and produces the tubercle ; while in Laulanie's observation it is the ovum or the embryo of the vascular strongle. Professor Cornil has testified that Laulanie's observation is perfectly exact, and also that it is entirely novel.

PROTECTIVE INOCULATION FOR TYPHOID FEVER (INFLUENZA ?) OF HORSES.

THE most interesting event of the Hygienic Congress, whose sittings have just terminated at Geneva, has been Professor Pasteur's address. As is well known, the illustrious *savant* has made some very important discoveries in the attentuation of the virus of transmissible diseases which promise to lead to results of incalculable benefit to mankind and animals. Until another opportunity offers, we will here only give a brief abstract of the address, in order to direct attention to a most important announcement the Professor made with regard to the serious disease of horses which has been designated by our French colleagues Typhoid Fever, and which in this and other countries is usually known as Influenza or Horse-plague.

The Professor began by saying that he was glad to accept the invitation sent him by the Committee of Organisation, as it enabled him to give another proof of the kindly relations existing between his country and Switzerland, and also because he hoped to meet there honourable opponents devoted to the cause of progress and science.

Our first knowledge of virus was that of Fowl Cholera, which we have succeeded in attenuating and preserving, with a view to transferring it to healthy fowls in order to protect them from the disease. This modification was obtained by exposing the virus to the oxygen of the air. The facts relating to Fowl Cholera were subsequently applied to Anthrax. (Pasteur here rather violently attacked Dr. Koch, of Berlin, who was present, and who is directly opposed to Pasteur's theories on scientific grounds)

The Professor then mentioned a series of experiments which he had made with the saliva obtained from two children and a workman affected with Hydrophobia, and which he had employed to inoculate rabbits. It proved that the disease could be transmitted by means of this virus successively to different animals. He stated that the *Bacilli* or *Microbes*, cultivated apart from oxygen, became more and more virulent, while when exposed to oxygen they became gradually attenuated in their virulence.

The principal object of his communication was to prove that this fact proceeded from an exact law, susceptible of numerous applications. The point to be ascertained was whether the microbe of the virus of Hydrophobia is present, and whether it has had time to develop another virus which alone is capable of causing death, and leading to confusion in the results obtained. The experiments in this direction were laid before the Academy of Medicine, and were confirmed by those made by Dr. Maurice Regnault, at the hospital of Saint Eugène. From the careful observation of all these facts, the existence of this microbe is established.

The Professor then went on to prove that the presence of the microbe was the cause of Hydrophobia, and to reply to the attacks of Dr. Koch and his followers. He stated that several points of his communication had not yet been published, and he called attention to the parallelism between the experiments relating to the microbes of Fowl Cholera and those of the rabific virus. This microbe re-appears in the blood. So far, three very different microbes have been discovered : that of Fowl Cholera ; that of Anthrax ; and that of Hydrophobia. But a fourth had recently been discovered by him, which will still further tend to prove the general law already referred to ; this is the microbe of the Typhoid Fever of horses—a disease which, during the recent epizooty, had destroyed 1,500 horses belonging to the Paris Omnibus Company. The nasal mucus of diseased horses, when inoculated into rabbits, developed this same Typhoid Fever in them, and which was recognisable by the same pathological symptoms as are found in

ordinary Typhoid Fever. The Professor, however, did not pretend that the relation between the microbe of this epizooty and the development of Typhoid Fever in horses, had yet been proved. A sufficient degree of attenuation had been obtained to yield a virus which did not produce the fever, but prevented it.

We had here a general law relative to inoculation, and a general method of application. We might well hope that these principles would lead to the discovery of a new remedy.

Dr. Koch was invited to reply. The Prussian Minister of Agriculture had appointed a commission of experts to examine this question, and experiments on a large scale had been made at Berlin. It was of great importance to learn how the contagion of Anthrax was communicated to animals grazing on land in which diseased creatures had been buried. The spores had been found in the earth brought up by worms.

At the close of this address, of which the above is a very imperfect *résumé*, Dr. Koch answered briefly in German, to the effect that he would not enter into a discussion in a language which was understood by only a portion of the Members of the Congress, but reserved his right to reply through scientific publications.

EXPERIMENTAL RESEARCHES IN ANTHRAX.

PROFESSOR FESER, of the Munich Veterinary School, has for several years been investigating the different forms, as well as the special features, of Anthrax, at the experimental station established for that purpose in Upper Bavaria, and the results of his researches up to 1879 have recently been given. These refer more especially to what is known as Carbuncular emphysema, Symptomatic Anthrax, or "black quarter"; to the influence of alpine pasturage; and to the influence of water, in the production of the disease in those localities in which it prevails.

Feser was the first in Germany to insist that this malady is altogether different to Splenic Apoplexy or Milzbrand, and more dangerous than that disease; that it is an infective malady due to vegetable organisms; that young and badly-nourished animals are most predisposed to its attacks, and that it can be most readily communicated to them by subcutaneous inoculation of the blood, exudates, juice of flesh, etc. Simple inoculation of these is usually without result. He also maintains that Parturient Septicæmia (Parturient Fever) is absolutely identical with it, so far as macroscopical and microscopical lesions are concerned. The *Bacteria*, *Bacilli*, or *Schyzomiceti*, which produce these maladies have no need for oxygen to live and grow; on the contrary, the prolonged action of oxygen upon them diminishes, at first, their vitality and virulence, and finally renders them harmless.

The tissues of animals which have died from this Carbuncular emphysema preserve their virulence, even after complete dessication.

A most careful examination of the herbage growing in the marshy pastures of the Alps, where the disease prevails, has demonstrated the existence of *Bacilli* and *Schyzomiceti*, morphologically similar to, if not identical with, those of Splenic Apoplexy and Carbuncular emphysema. These organisms were injected beneath the skin in forty-three animals—chiefly sheep and rabbits, and of these thirty-six were unaffected, while seven died—two rabbits, a sheep and a mouse, of a septic affection identical with this Carbuncular emphysema or Symptomatic Anthrax: one (a sheep) of Tetanus, another (a rabbit) of Pyæmia, and another (a rabbit) of Splenic Apoplexy. These

artificial cases of Splenic Apoplexy and Carbuncular emphysema did not differ in any respect from the diseases as naturally produced.

Researches and experiments made with the water of these infected regions, led to the belief that it had no influence on the development of the malady; though, of course, if the water chanced to be stagnant, and contaminated with the excretions of diseased animals, the reverse was the case.

THE PREVENTION OF CRUELTY TO ANIMALS IN INDIA.

BY R. POYSER, F.R.C.V.S., ARMY VETERINARY DEPARTMENT, "THE CARABINEERS."

(Continued from page 197.)

STARVATION and exhaustion, not unfrequently resulting in death, are other forms of cruelty arising from want of food and clothing, from overwork and general mismanagement.

Thousands of camels have thus perished, and amongst gharry horses, ekka and grass cutters, ponies and donkeys, such cases are very numerous.

The calf is subjected to a most systematic process of starvation from its very birth, its natural sustenance being demanded for and supplied to the household and market; this form of cruelty I think is most heartless, because it is, as it were, premeditated, and so prolonged. The practice is a shameful abuse of man's power and right over the lower creation, inflicted as it is upon the young and delicate little suckling, unable to maintain itself independently of its mother, for whose nourishment a proper substitute is not furnished; if it were, there would not be much roomfor complaint. I do not mean to say that death usually results from starvation in these cases, though I have known it to do so. Somehow or other many survive this inhumane ordeal, though the fact of their doing so does not warrant the practice any more than does the object, in itself, for which they are starved. Nothing but the fear of the law will tend to diminish a form of cruelty which is imposed on no other young and helpless animal, except the goat, without provision being made for the substitution of a suitable food.

The abandonment of sick, lame, and disabled animals to die a lingering death, through which means perhaps disease is maintained and spread, is another act of inhumanity amounting to cruelty, common wherever the Hindoo religion prevails.

Can anything more piteous and revolting be witnessed than a poor dumb animal down and unable to rise or move—owing to a broken limb, for instance—left to perish by the roadside from pain and starvation, to be pecked by birds and gnawed by dogs and jackals long before life is extinct, when the friendly bullet or knife might so quickly and mercifully dispose of its sufferings? I think not; but I have seen more cases than I can remember, and applied the merciful remedy whenever possible. The improper conveyance and packing of animals, whereby they suffer from want of ventilation, food, and water, and injure each other in their struggles for air and a comfortable position, or anything done during transit to cause unnecessary pain, constitute cruelty, and such offences are indictable and punishable.

The following instances are practices of a cruel nature to be seen in all our markets, bazaars, and our own compounds and cook-houses:—Tying fowls by their legs, three and four together in a cluster; carrying them head downwards, and ducks and geese by their necks or wings; tying hares' legs together and sewing up their mouths; huddling large numbers of small birds together in the bottom of a bag, as is done with quail, pigeons, and

others; knocking out the teeth of animals captured and trained for exhibition, as is practised upon performing bears and, I am told, monkeys; dragging out the long wing feathers of pigeons and other birds to prevent their escape, when clipping would suffice; twisting and locking one wing round and behind the other or tying them above and close to the body; setting fire to straw underneath horses, camels, and bullocks, by which they are brutally charred and burnt; smearing dogs with kerosine, setting fire to it, and turning them loose—a most atrocious example of which is reported by "Spectator" as having occurred in Lahore on the 27th May; and what is worse, this is the second atrocity of the same kind by the same person; branding with a hot iron the skins of animals shortly to be slaughtered, when marking with indelible paint would be sufficiently permanent to frustrate any fraudulent intention of the dealer or butcher—if that is the object for which municipal and other authorities adopt the searing process, which is well known to reduce the market value of the hide and to injure it for the manufacture of leather; branding the skins of horses and bullocks with a hot iron for purposes of identity, pedigree, classification, registration, and rejection, is carried on to a much greater extent than need be; it produces not only an unsightly disfigurement, but the denuded and injured surfaces do not well bear the pressure and chafing of harness and saddlery, for which reason many horses in the army, for instance, are often thrown out of work. If branding is at all necessary in India the cruelty might be minimised, for which there is much scope in well-known places. Horns and hoofs could often be selected as branding sites; they are sufficiently permanent for many cases.

Natives are in the habit of searing and scoring with hot irons the skins of horses and oxen for all kinds of lameness and supposed affections, as well as for superstitious reasons, and thereby inflict a vast amount of needless pain and suffering over extensive surfaces.

This class of cruelty arises out of ignorance, as does the searing with a heated iron the tender palate of a horse's mouth to destroy what is termed "Lampas," or a fulness just behind the upper front teeth, a condition very often imaginary, and invariably a symptom of fever, dental irritation, or other ailment, and which disappears on their subsidence. At the worst, a few lancet cuts only are necessary.

Burning the opposing surfaces of the horse's front teeth to reproduce the lost marks which are the natural indications of youth; and punching out the temporary teeth of three and four years old horses to give them an appearance of older ones, are cruel and fraudulent practices adopted by dealers.

Then what shall we say of "tail-twisting," of the knotting and gnarling of the ox's tail, until it is literally screwed off at its base, or so injured as to hang in a paralytic condition to the end of the creature's life, utterly useless for the main purpose ordained by nature, and only used as as an instrument of torture against its possessor? I do think a mean and abusive advantage is taken of this useful and ornamental appendage of the docile and patient "byle;" it is a liberty which I venture to say would be taken with few other animals, for reasons which I need not point out.

From the pain inflicted, he tries to escape by hurrying on his load—and this is a proof of the cruelty—and when he has forgotten the pain and relaxes into his naturally slow pace, it is only to have the screw again applied. Tail-twisting—especially in byle-racing—is, I dare say, as justifiable as the higher art of flogging and spurring in horse-racing, the motive being encouragement rather than punishment: but the result in each case is painful and not humane, though both are time-honoured inflictions, sanctioned by custom, and regarded as essential to the success of one thing, as the light flick of the driving-whip is to that of another.

The bullock-driver is in the habit of goading his beasts with a stick armed

with a sharp iron spike, and amongst natives the use of spiked bits in horses' and ponies' mouths is very general, and often inflict considerable injury on the jaw, and always severe pain.

The use of the bearing-rein does, without doubt, restrain the freedom of a horse's movement, and keeps his head in an unnatural and uncomfortable position so long as the rein is hooked on to the saddle stud.

Its abuse converts it into a rigid, unyielding instrument of torture. The bearing-rein, like the standing martingale, is not to be entirely condemned; both are objectionable, and limit the power and movement of a horse, but are sometimes necessary for the safety of both man and horse: it is quite possible to use them effectively without causing pain or much inconvenience.

Used, as I have seen them, with spiked bits, is a double infliction of cruelty.

Under the attractive denominations of sports and pastimes, which sometimes involve destruction of life, and almost always suffering, a great number of barbarous customs still prevail in India, which I am sorry to say receive the countenance and tolerance of English society. The prince of one native state entertains the prince of another, or a British assemblage, with a series of contests between animals kept for fighting purposes, and the lower orders of the people perpetrate similar atrocities on a smaller, though, perhaps, no less cruel scale.

Last Christmas, at his installation, the Guicowar of Baroda entertained a large and distinguished party of English ladies and gentlemen, with elephant, bull, and ram fights. As regards the elephants, the cruelty imposed is not limited to the onslaught and struggle between the contesting animals, but they are goaded with spark-pointed lances, and lashed with whips, and have live furzes flashed on them in certain encounters. These horrible scenes, and more horrible human conflicts where the combatants' hands are armed with claws, are graphically described in a work called, "India and its Native Chiefs," but it refers to the days of the deposed and exiled Guicowar.

But what I now relate comes from an eye-witness.

In the case of the bulls, the sight of each other was sufficient to excite a conflict, during which their horns became locked, and one was wrenched off. Rams are always keen to fight, and those who witnessed such brutality could not have helped wincing and feeling sick, when the combatants' heads came together with a battering crash.

Sir James Ferguson, who is patron of the Bombay Society for the Prevention of Cruelty to Animals, would not stay to see these cruel sports, to which he is said to have expressed his aversion.

If the remainder had discountenanced them by declining to be present, the reason would have suggested itself, or been conveyed to the host, who, at his impressionable age, might have received a salutary and lasting lesson on behalf of humanity.

In this category of entertainment must be included, and condemned, dog-fighting, cock-fighting, duck-hunting with dogs, quail and other bird fights, practices diminished by the influence of the law at home, and preventible by it in India.

Pigeon and parrot shooting from traps is neither a noble nor elevating occupation; though fashionable, it is often cruel. Maiming and blinding pariah dogs with a shot-gun, and hunting them with heavy whips and spears, are also cruel procedures, far removed from sport.

The camel suffers intense agony from the insertion of a wooden billet or plug through his nose, and is further tortured by being tied by a cord running from that plug to the tail of another camel.

The nose of the camel, like that of most animals, is highly sensitive, to which he bears vocal testimony when it is dragged by the driver or the preceding camel.

For baggage purposes, nothing but a halter and rope are necessary.

We profited by the lesson taught by the Afghans, whose camels move independently and free, and during the late war hundreds of these wooden instruments of torture were removed from our camels.

The Afghans, too, understand the constitution and capabilities of camels, and know how to march, feed, and manage them; but, allowing for all exigencies connected with an invading, occupying, and retiring army, experience forbids my passing the same compliment on our own treatment and management of this most useful and indispensable transport animal.

The nose-peg and cord are probably essential to guide and control the riding camel; at any rate, this method could hardly be given up until a more humane and equally satisfactory one has been invented.

The "twitch" is an implement, the cord of which is twisted tightly round the horse's nose, and often unnecessarily and inconsiderately used; it should be discarded as much as possible, though it is a valuable aid in subjugating a horse during minor operations, and it helps to ensure the safety of the operator and attendants.

It is requisite to use severe restraining agents to render our domesticated animals obedient, tractable, and useful, but it is our duty, and should be our pleasure, to guard against the abuse of such instruments as the bit, the whip, the spur, the nose-peg or ring, and the iron crook which the mahout employs in driving and managing the elephant.

The most frequent and palpable evidences of cruelty are wounds and bruises, the result of injuries, the galling, chafing, and pressure of harness, saddlery, and the yoke, under which the sores in the majority of cases are found.

I shall not attempt their detail, but merely say that such are aggravated by working whilst in this state, by low condition, by ill-fitting and rigid harness, by starvation, climate, by flies, by improper treatment or no treatment at all, and ignorance and general carelessness.

There are a few operations considered by some to be beautifying to the victims, but which should be opposed as being cruel, excepting disease or some other excuse equally justifiable can be shown to exist. I allude to the cropping of dogs' ears and tails, examples of which are to be seen wherever British troops or communities reside.

No justifiable plea can be advanced for the practice of these common and fanciful mutilations: they may give an air of smartness to a dog, but are neither useful nor ornamental.

In England it is an indictable offence to crop the combs, wattles, ears, and tails of animals, and I hope ere long to be able to say the same for this country.

I have now to condemn almost absolutely an operation, once very prevalent in England, but at the present time only performed on sufferance. I mean the amputation of horses' and ponies' tails, usually termed "docking." Since "Polo" has become so popular a game, docking has very much increased in India, indeed it is so very fashionable, that one seldom sees a pony, amongst Europeans, that has not been curtailed, the only object being to smarten appearance, which it effectually does in most cases. Even the native dealers have recognised the necessity of pandering to the public taste in this respect, and amputate the tail of almost every pony that comes to hand.

Excepting in the case of disease or malformation, or where a horse has acquired the annoying and dangerous habit of throwing his tail over the

reins (even in this instance the driving bar could be raised), docking is unnecessary, and therefore cruel, for it is not only attended with pain, and may bring on lock-jaw and death, but it is often clumsily performed, and it deprives him of a means of defence against the annoyance of flies, and the torture of stinging insects.

Shortening the tail-hair, and not the bony and fleshy stump, suffices for all practical purposes.

I trust I shall not incur the displeasure of the lover of the "bob-tailed" pony, but surgery in these days is very *conservative*, and very properly condemns so *radical* an operation as "docking."

I regard the destruction of starving, diseased, homeless, and ownerless dogs as cruelty justifiably inflicted, unless they can be otherwise more humanely disposed of.

Their very existence in cities, bazaars, and villages is a cruel one: moreover, they are dangerous to mankind, obstructive to traffic, and very loathsome objects to behold.

Now, as regards sport. Whatever arguments may be advanced in justification of the pursuit of wild animals, I look upon it as wantonly cruel to run a fox or jackal or any other creature which has been maimed or injured by the means employed in its capture, or that has suffered in any way by subsequent confinement. It is also equally, if not doubly cruel to deprive a bird of its chance of escape by removing a portion of its feathers, for the sake of training hawks. And I say this because I hold that all animals chased, under the title of sport, by other animals physically stronger, bolder, swifter, and generally more numerous, should start on the best possible terms, and at least have the opportunity of saving their lives, and nothing can justify any means adopted to render that chance impossible.

I have no intention of trespassing on the debatable grounds of sport or the pain connected therewith, but will quote the Bishop of Carlisle on "Our Moral Duty to Animals." After confessing that he had never been a sportsman, and therefore had no special temptation to regard the question from a party point of view, which I think he had, he says, "When I happen to see the hounds, my sympathies are with the fox. Nevertheless, it is quite clear that the instinct of sport is so deeply rooted in the natures of the masses of mankind, that to regard the chase or shooting in the light of a cruel amusement would be almost universally deemed ridiculous; that the love of sport is a remnant of an instinct implanted in man for good purposes; that it is unnecessary to man in a state of civilization, and that in all probability it will fade away by degrees and finally vanish; that it is a relic of the wild epoch of man's nature, and will one day be regarded as strange and barbarous.

"Yet, while the love of sport remains, it is not altogether unreasonable that men of science should refer to the toleration of pain connected with field sports, as an argument for caution and fairness in dealing with pain connected with experimental investigations.

"The principal remark, however, which I have to make on the subject of all sport, whether field sports or otherwise, which are now tolerated, is that I see no course open to the law but to leave them alone. It is conceivable that there may be incidental cruelties introduced which the law might properly restrain; but, speaking generally, it would clearly be impossible for the law to interfere, with advantage, in a matter in which interference would be opposed to nine-tenths of the population."

He concludes his paper, which sets forth very moderate views, by saying that "when we look at the total number of convictions in England in 1881, viz., over 4,000, we can scarcely help feeling strongly that it is well that a Royal Society for the Prevention of Cruelty to Animals exists, and that it is a sad thing that its existence should be necessary. On the whole, however

I am disposed to believe that the public opinion on the subject is sound; even the extravagant views, as they seem to me, of the extreme anti-vivisectionist, are, to say the most, benevolence gone a little mad." And I would add, gone very mad.

Having well nigh exhausted the chief details of my subject, in so far as is expedient for the consideration of a general audience, it only remains for me to strongly commend this important and beneficent work to every resident in India, and particularly to those who possess the power and influence to establish and promote Societies for the Prevention of Cruelty to Animals.

Commencing with Lahore, which has often raised its voice against the practice of cruelty there, a central or parent Society might be formed under high patronage, possessing its own Secretary and officers, aided by the Government, the law, the public, the police, the principal of the Lahore Veterinary School, and possibly the "Anjuman-i-Punjab," constructed on lines improved from those of other societies, and having branches in all the cities, cantonments of the Punjab, and so on for all the presidencies, provinces, districts, and, if possible, native states of India. The first advance in this direction, however, to be advocated and accomplished, is the extension of the Act for the Prevention of Cruelty to Animals throughout the length and breadth of the land. After this, the formation and working of societies would become matters of local arrangement and detail with which I am not now concerned, but in which I should be glad to lend a helping hand if necessary.

NOTE.—Connected with the subject are a number of cruel practices and operations extensively carried on in India, some of which are indictable and punishable, and to which I could not refer before a distinguished audience, honoured by the presence of ladies. I have, however, written on one section of the subject before, an account of which, under the title of "Orchithlasis," will be found at p. 12, vol. i., VETERINARY JOURNAL, 1875, by "Hippochirurgus," my then *nom de plume*.

THE TEXAS FEVER.

DURING the spring and summer, for more than twenty years, there has been a large shipment of Cherokee and Spanish cattle to the Northern States of America. Some are used for beef at once, while others are turned out to pasture for the season. In this way our native stock are exposed to these wild and roving creatures; and in due time a malignant malady, peculiar in many respects, appears within our midst. Its invasion is often very sudden, but it rarely breaks out before the middle of August, and continues till cold weather.

Though this disease, of late years, has been of common occurrence in the Western, Middle, and even in the New England States, yet farmers had no experience with its ravages until the general traffic in Texas cattle had been established. Several efforts have been made to protect our Northern stock from exposure along the line of transit, but the increasing demand for fat and store cattle in the Eastern States has greatly interfered with any quarantine measures that might otherwise seem desirable. Accordingly, our native animals, and those from the Plains, have frequently come in contact, and thus free exposure has occurred, both at the feeding stations and on the cars. In this way an *annual* contagion has been disseminated throughout the land.

The period of incubation has not been accurately determined by experiment; but according to our observations in many well-marked cases from

ten to forty days may elapse from the time of exposure before an animal will show signs of being affected. In fact, there is a great difference in the susceptibility of our Northern cattle to this infection. Some may even escape it altogether, while others will fall victims to it at once.

The temperature and the time of the year have much to do with its early manifestations. The infection we have invariably found to be the most virulent during the warm, sultry weather, and in a cold, wet season it is usually very inactive. Hence, the time for the appearance of the first symptoms, after a given exposure, is very uncertain. During dog days most of the exposures are effective, the disease soon follows, and usually with fatal consequences; but later in the season, the invasion is less marked after exposure, and the mortality much reduced.

Nature of the Malady.

The native haunts of this disease are the tide waters of the Gulf. It never occurs spontaneously in a region visited by frost, and when carried beyond this thermal line in summer soon dies out on return of cold weather. In the Northern States it is not contagious from one native or acclimated animal to another, and consequently this malady can only be induced by exposure to Southern cattle that have not been wintered beyond the line of snow. This disease, therefore, must be regarded, in the light of comparative pathology, as a specific fever, uniform in its type, from year to year, and propagated by contagious effluvia. The alvine discharges are undoubtedly the principal source of infection, as can be shown by experiment. This usually occurs but once in an individual, and only in bovine animals, as the horse, sheep, and swine are never affected, however much they may have been exposed.

The manner in which this affection appears is quite variable, owing to the age and general condition of the animal. In cows, the diminution of milk is one of the first symptoms. The ears droop, the gait is sluggish and tottering, with a disinclination to move. The animal will stand in one position, with head depressed, when more or less trembling will be seen about the flanks. In a few days, the patient looks thin and hollow. The abdominal walls appear shrunken, and the back will be arched, as though suffering from distress or internal pains.

The skin is usually dry and hot, especially about the head, and rarely moistened on any part of the body with perspiration. The bowels are costive, but not unfrequently a fetid diarrhœa will supervene in the last stages. The urine is invariably scanty, high-coloured, and even bloody. In fatal cases, the bladder becomes distended, its wall paralyzed, and all power of micturition lost before death.

The diagnosis of this malady, therefore, is not difficult, especially with the aid of a thermometer, to determine the degree of fever heat. The elevation of temperature indicates the severity of an attack, and will be found to vary from 101 degrees, the normal standard in cattle, to 107, in fatal cases. The "ticks" are an important aid in doubtful cases. Their presence serves as a *label*, to tell us either from whence the animal came, or the exposure it has encountered. Consequently, when we find a sick creature that is covered with ticks, and shows a high fever heat on thermometer, we can be almost sure, even at an early stage, that it is a case of the Texas plague. But this will soon be corroborated by a high-coloured urine, which, on account of the congested condition of the kidneys, is a characteristic symptom; and, in fact, we have never seen an animal sick with this complaint that was not affected with Hæmaturia.

Post-Mortem Appearance.

The morbid aspect of the internal organs, after death, is so marked, that we are enabled to decide a doubtful case at once. The spleen, or milt, is always found much enlarged. It is often increased to five times its normal weight. This organ is so completely engorged with blood, that chemical changes set in before death. The tissues will, accordingly, appear soft, and not unfrequently the viscus is found ruptured. We have examined several cases where the spleen was more than two feet long, eight inches wide, and three in thickness, and weighed ten pounds. Such an organ cannot easily be overlooked.

The liver has a softened and waxy appearance. It is very yellow in colour, but with an occasional tinge of greenish black. This organ is usually much congested and enlarged, weighing from twenty to thirty pounds. The gall-bladder is surcharged with dark, viscid, and flocculent bile, the granular nature of which is brilliantly shown by transmitted light.

The kidneys, as before observed, are congested, swollen, and softened. They are often so much enlarged as to appear disturbed in form, as though they were twisted. On section, the tissues are dark, and unnatural in appearance. Hence the bloody urine, scanty though it be, that must escape from such an impaired organ, and which at once becomes of vital importance in the animal economy.

In ordinary cases, the heart and lungs show no signs of disease. But there is more or less inflammation and erosion about the stomach, especially in the fourth apartment, known as the *abomasum*. This, with the upper portion of the bowel, is congested and partially softened, the effects of which changes are often seen in healthy Texas cattle when slaughtered in Northern markets.

The blood also undergoes important changes. The red corpuscles are perceptibly modified in form and size, as well as wonderfully diminished in quantity, in the last stages. Hence the reason for the diffusion of the colouring matter all over the body before death. Bile can always be detected in the blood of one of these sick animals, and thus acts as a solvent on the anatomical elements. Cholæmia, therefore, exists, as shown in all the exudations beneath the skin, and in all the internal organs.

With the condition of the system as seen from a *post-mortem* examination, treatment can avail but little. Various plans of medication have been resorted to, but thus far with questionable results. No specific medicines have yet been found to stay its ravages. Eliminatives and antiseptics would naturally seem to be called for, and have been given in certain cases with good results. But it is impossible to select even an approximate remedy until the pathology of this contagious malady is better understood; and this can only be accomplished by experimental investigation, which should ever be the theme of a National Sanitary Commission, appointed by the President. —*Chicago National Live Stock Journal.*

RINDERPEST IN RUSSIA AND THE CAMPAIGN IN EGYPT.

THE last issue of the VETERINARY JOURNAL contained some allusions to the dangers attending the importation of Russian cattle into Egypt for the use of the British troops there, as the history of Cattle Plague showed that in every war—from the earliest to the latest—in which supplies of oxen were obtained from Russia, the disease accompanied them and ravaged the countries into which they were imported, often extending far beyond these. This

fact cannot have been known to those who arranged for the importation of these cattle into Egypt, though it should have been; and the ignorance manifested by the War Minister—though for this he cannot be held responsible—when he stated that Cyprus had not been visited by the disease, though it had received Russian oxen, shows that the War Office might advantageously consult veterinary authorities with regard to such apparently unimportant matters as the source of animal food for soldiers, as well as forage for horses. Cyprus, as was pointed out in the JOURNAL, was most severely visited by Cattle Plague in 1880, through the importation of Russian oxen from Odessa; and now we learn that on the 23rd of last August the English Consul at that place telegraphed to Egypt that the disease was raging in and around Odessa. A large number of cattle had already been landed at Ismailia, and if Egypt escapes another calamitous invasion of the scourge—this time through our own remissness—it will be due to immense good luck, and the careful inspection by our Army veterinary surgeons of the Russian cattle, in order to detect the presence of infection among them. It must be remembered, however, that the malady sometimes affects the steppe cattle so slightly that it has sometimes escaped detection by skilled veterinarians. An outbreak of the disease in Egypt just now would be indeed a terrible finale to the disasters that country has already sustained. At any rate, it will be seen that the warning conveyed in the letter to *The Times* of August the 14th was not inopportune; and we can only hope that our Army may not unwittingly have been the cause of introducing Cattle Plague into the country they have saved from impending ruin. With the whole basin of the Mediterranean to draw supplies of oxen from, it is indeed surprising that Russian cattle should have been preferred.

VETERINARY SCIENCE IN INDIA.

THE lamentable state of India with regard to veterinary matters, and especially with reference to the enormous losses sustained through the ravages of preventible diseases, has often been brought to notice in this Journal, and the urgent necessity for the institution of a veterinary sanitary organization insisted upon. But so far from any move in this direction being attempted, the condition of India is likely to be worse than ever, owing to the reduction of the Army Veterinary Staff in that country by twenty-four members. The very serious prospect which this diminution in the number of veterinary surgeons opens out, impelled the editor of this Journal to place himself in communication with a well-known Member of Parliament and patron of agriculture, with the view of bringing the subject before the legislature. The following correspondence will show how the question has been treated, and the result will, we think, be pronounced satisfactory so far. At any rate, it affords reasonable hope that the Indian authorities will not allow any more time to elapse before they have placed that great country under some kind of veterinary organization or system which will, at least, greatly decrease the ruinous losses caused by animal diseases.

From Mr. Fleming to —— M.P.

February 14th, 1882.

DEAR ——,—Well knowing your great interest in the prosperity of our empire, and especially in an agricultural point of view, I have taken the liberty of drawing your attention to the state of affairs in India, with the object, if you think fit, of bringing the matter before the House of Commons.

India, as you are aware, is essentially an agricultural country, but it is

infested by the most serious and destructive animal diseases. Cattle Plague is never absent from some part of it, and causes fearful havoc; Foot-and-Mouth Disease is always more or less prevalent, and attacks not only cattle and sheep, but also camels and elephants; Sheep-Pox is often seen; and Anthrax is indigenous, and destroys horses as well as cattle; while Glanders is wide-spread. The losses caused by animal diseases are estimated at *six millions of pounds annually*, and this is probably under the mark.

To combat these scourges there is no machinery whatever. In the whole of that immense country—larger than Europe—there are at present only seventy-three veterinary surgeons, and these belong to the Army, and are all too few even for Army work. When a disastrous outbreak of disease occurs, some of these veterinary officers are detached from their regiments or corps to suppress it. But I need scarcely say that their exertions are seldom of much avail, owing to their being too few in number.

I received a letter yesterday from an Artillery veterinary surgeon who, alone, had been sent into the Punjab—a country nearly as large as Germany—to suppress Cattle Plague!

Though there are only seventy-three Army veterinary surgeons in the whole of India, it is now proposed to reduce this number to forty-nine.

There is a Minister of Agriculture, but no Veterinary Department; and the enormous losses sustained by animal diseases are not attempted to be checked, but, on the contrary, will evidently be increased through the reduction of veterinary surgeons.

This is neither a professional nor a political question, but an imperial one. India is not thriving in our hands, and never can so long as such mismanagement prevails. It is not for the natives to stamp out these destructive pestilences; indeed, they will not do so, as their nature is to be indolent, while their belief is "Kismet."

The attention of Parliament has never been drawn to the matter, and the Indian Government is a century behind the age. It would be in the highest degree patriotic to draw attention to the absence of a Veterinary Department in India, to the terrible losses caused by preventible diseases among animals, and their effect on the prosperity of that country; to the altogether inadequate number of Army veterinary surgeons, even for Army service; and to the proposal to reduce these to forty-nine for the three Presidencies.

If India belonged to France or Germany, these diseases would soon be extinguished by means of a properly organised sanitary (veterinary) force. All the diseases which do such damage are preventible, and only need a good staff, working under the Minister of Agriculture. This staff would pay its expenses a thousandfold and add greatly to the welfare of Hindostan. In every European country such a staff exists, and some countries—as Germany—could not keep any cattle or sheep without a more or less effective system of veterinary police.

Nothing could be more culpable or foolish than our management of India in this respect; and I am in hopes that something would be done to remedy the discreditable state of affairs if it could be brought to the notice of the House of Commons. Those who have to do with India unfortunately do not understand such matters, and they allow them to remain as they have been from time immemorial.

The facts and figures pass, to some extent, through my hands, and they are startling and painful. They are certainly not creditable to us as an enlightened governing people.

I hope you may see your way to broach the subject, as I am certain you would, from your position in the agricultural world, be eagerly listened to.

Yours truly, ——

To ——, M.P.

Feb. 14th, 1882.

DEAR MR. FLEMING,—I have duly received your letter, and the matter it contains interests me much, and makes me feel desirous to endeavour to do some little good, by bringing the state of cattle diseases in India before the public, and so endeavouring to create an interest which may stir the authorities to some action. When I reflect, however, on, first of all, the great difficulty of getting any question before the House of Commons, and then, on a Private Members' night, getting any one to listen to it: and secondly, the great apathy displayed by the House of Commons on all matters, even the Budget, connected with India, I feel that any effort on my part to even ventilate the subject may, indeed will, prove abortive. The alternative then occurs to me, whether I could not do more good by showing your letter myself to Lord Hartington, and endeavouring to interest him in the matter. I know him personally, and could easily speak to and read him your letter.

It is from no wish to be lazy and shirk getting up the subject, for I know nothing of it at present, or where to find the statistics, etc., but should have to come to you for all this, that I propose this, but simply to place the suggestion before you, and I shall await your answer before taking any further step.

I will only add I fear you greatly over-rate my influence in being listened to in the House of Commons. Almost any subject there is hardly tolerated now, and India is, apparently, the last place of interest.

To ———, Esq. Yours truly, ———

From Mr. Fleming to ———, *M.P.*

Feb. 23rd, 1882.

DEAR ———,—I am greatly obliged to you for your letter respecting India. The question is of such serious moment to our empire, that I think no delay should take place in bringing it before those who are best able to deal with it. You know how I have agitated for measures and means to extinguish contagious diseases among cattle and other animals in this country. India is in a much worse plight than England has ever been, and matters threaten to be even more aggravated there, in consequence of the proposed reductions. As it is, the attempts to control contagious diseases are simply ridiculous, and only end in disaster.

I have a letter now before me from an Army veterinary surgeon in the Punjab, in which is the following statement:—"So far as any sanitary or preventive measures being adopted by the Civil authorities are concerned, it may be simply said 'these do nothing.' The amount of Cattle Plague that is about is something fearful. But in the whole of the Punjab, a country nearly as large as Germany, myself and two native assistants are supposed to be sufficient. And this is looked upon as the model province in India, and to be far ahead of all the others. Last year I was sent up into the Kangra Valley, the tea district in the hills, to investigate an outbreak of disease, which turned out to be Cattle Plague. The official returns for the year 1880 shows 7,000 deaths, but I really believe from what I saw, that three times that number would be nearer the mark. It is most heart-breaking work going on like this, and seeing the enormous losses and mortality that occur, while one is utterly powerless, single-handed, to stop them. I feel at times very disgusted with the whole country."

This is from one of the best and most energetic veterinary surgeons I ever met. It is only one of scores of instances brought to my notice.

No country can prosper when such a condition exists, and it was with a view to endeavour to have matters remedied that I took the liberty of writing to you.

I am sure Lord Hartington knows nothing of it, or he would soon act. You are at perfect liberty to read my letters to him, if you think fit, and if

his lordship would like to see me on the subject, I shall have great pleasure in waiting on him.

Yours, etc., ———

From Mr. Fleming to ———, *M.P., acknowledging receipt of a copy of a Minute from the India Office and Despatch from Lord Hartington, Secretary of State for India.*

May 5th, 1882.

DEAR ———,—I am very thankful to you for so kindly sending me the papers relative to Lord Hartington's decision in the matter of animal plagues in our Indian empire. You have done the country good service in this matter, and I have to thank you personally for laying it so well before his lordship.

The minute, of course, tries to palliate the mischief; but my information is more likely to be reliable than that of the Revenue Department, as it is derived from the Army veterinary surgeons who have been detached from their regiments to suppress the calamitous outbreaks of disease.

The Indian Government should adopt the system of suppression and prevention I have laid down in my work on "Veterinary Sanitary Science and Police." Without men, system, and method, things will never mend.

Yours, etc., ———.

India Office Minute on Mr. Fleming's Letters.

———, M.P., sends for Lord Hartington's information and consideration two letters from Mr. Fleming, of the Veterinary Department, War Office, which his lordship has directed to be made official.

In these letters, Mr. Fleming, a high authority on the epidemic diseases of cattle, brings to notice the great prevalence of those diseases—Rinderpest, Pleuro-pneumonia, Foot-and-Mouth Disease, Anthrax, Glanders, Sheep-pox, and others—in India; points out the loss, estimated at £6,000,000 annually, which they cause, and what a heavy drain this is on a poor agricultural country; shows how utterly inadequate the existing strength of European veterinary officers in India is to cope with such a state of things; protests warmly against the reduction of that strength, now under contemplation, from seventy-three to forty-nine officers; criticises severely the alleged neglect of the Indian Governments to do anything whatever for the prevention of cattle disease; and, finally, begs earnestly for immediate and vigorous action in the matter.

I. It may be well to dispose first of the question of the reduction of strength of the Veterinary Department. On the subject I have consulted the Military Secretary.

It must be remembered that the general question now raised by Mr. Fleming is a purely *civil* one, whereas the reduction of the Veterinary Department referred to is entirely a matter of *military* organization, and cannot be influenced by any civil considerations. The Veterinary Department is solely a military one, and its officers are entertained only for military purposes, although their services have sometimes been freely lent (often to the great inconvenience of the officers themselves) to the Civil Departments on special occasions for duties like suppression of cattle epidemics. The Government of India, upon the report of their military expenditure commission, have, I understand, proposed for the approval of the Secretaries of State for India and for War, a reduction of the Veterinary Department to the strength they consider necessary for purely military purposes. The question of the need of a greater number of veterinary officers for civil administration must then be considered entirely apart from that of the strength needed for military requirements.

I may add, however, that the remnant of the old Indian Veterinary Department, now reduced to six members, and in process of extinction, is at present chiefly employed upon *civil* duties, mostly the improvement of the breed of horses in India.

To proceed to the general subject of Mr. Fleming's letters.

I should premise that I write much of what follows from memory, as the correspondence on the subject of cattle disease is scattered over a great number of years, and contained in administration reports, revenue and health reports, etc., of different provinces, and seems never to have been brought together in this office. I happen, however, to have some personal acquaintance with the subject, having served in several districts which have suffered much from cattle disease, and having had to take measures for the suppression of a bad outbreak of Rinderpest in the Island of Bombay, when I was Municipal Commissioner there.

II. I think that the account which Mr. Fleming gives of the ravages of cattle disease in India is not at all exaggerated. I do not know whence he has obtained his estimate (£6,000,000) of the annual loss, but I can quite believe that it is not too high. A diminution—sometimes a very serious one—in the numbers of cattle has attracted attention in many parts of India; and inquiry has usually shown that (putting out of the question periodical droughts and famine) its principal cause has been epidemic disease. The diseases are not apparently new ones; the inquiries of the Commission of 1870 went to show that at least most of them have been known from time immemorial; but it is the general belief of the natives in the provinces with which I am acquainted that they have become more destructive during the last quarter of a century.

III. But I think that Mr. Fleming much underates the difficulties of dealing with cattle diseases, especially epidemics, in India, when he says:—

"If India belonged to France or Germany, these diseases would soon be extinct, by means of a properly organised sanitary (veterinary) force. All the diseases which do such damage are preventible, and only need a good staff working under the Minister for Agriculture."

Putting out of the question the general difficulties, which we experience every day in, for instance, the promotion of sanitation as regards human beings, in carrying out measures which affect the daily life of a population so vast, so unenlightened, so wedded to old customs, and so suspicious of new ideas, as that of India, there are special difficulties in dealing with cattle diseases, some of which I will briefly notice.

I believe that by far the most effectual—perhaps the only effectual—measures as yet discovered in Europe for checking cattle epidemics are, destruction of infected animals and segregation or isolation of compromised herds or localities.

The first of these measures is out of the question in India, and this was the opinion of the Commission of 1870. There can hardly be a more infallible recipe to cause a rebellion in India, than to kill Hindus' cows against their will.

Isolation, though less objectionable, is scarcely more practicable. In the first place, cattle in Great Britain are bred for milk and meat only, and their isolation in any locality does not therefore involve any general inconvenience. In India cattle form the working power for all traffic and all agricultural operations, which would be entirely put a stop to in any locality by any general measure of segregation. The difficulty of carrying out effectively actual segregation is also very great. In India, farmsteads are not scattered about all over the country, each isolated in the midst of its own fields; the agricultural population live all together in closely-packed towns, in the middle of the lands of the Commune. All the village cattle—a survival

from the days when the fields were made unsafe at night by robbers and wild beasts—are kept at night, often in common, packed together within the village; they are driven out together, often by common herdsmen, to the fields in the morning; they are watered in common at the village tank; they graze all day in the common pasturage, or, if in the arable fields, these are totally unfenced; and they are driven back together to the village at night-fall, "cow-dust time," as the Mahrattas expressively call it.

Moreover, from want of water, pasture, and fodder, the cattle in many parts of India are obliged to be driven away in the hot weather to graze in the common hills and woodlands, where they must be kept in common in charge of the village herdsmen, and segregation is impossible.

The above will give some idea of the immense difficulty of enforcing authoritatively effective isolation, until, at least, the people become sufficiently enlightened to change their whole way of living in order to make it possible.

I should notice, too, that a great deal of the mortality of Indian cattle is caused, not by epidemic, but by climatic disease, especially at the beginning of the rainy season. During the hot weather, the cattle are fed on dry food, the more valuable animals on the straw of millet, the poorer ones on what withered grass, leaves, and roots, they can pick up upon the parched commons and hill-sides, and the latter, at least, get much reduced in condition. Then the rain comes down in torrents, the young rank grass springs up as if by magic, the cattle eat voraciously, and numbers die of "Hoven," or of Bowel Complaint. No sanitary precautions can affect this kind of mortality, though it might doubtless be much reduced by a general knowledge among the agricultural classes of the appropriate treatment. The Commission of 1870 found, for instance, that the cure for "Hoven," puncturing the rumen, is generally unknown.

IV. Mr. Fleming is mistaken in supposing that the Government of India have done nothing with the object of checking Indian cattle plagues.

The subject has received much attention from time to time, especially in Southern India, where, in 1848, Dr. Gilchrist, and in 1864-8, Veterinary-Surgeon Thacker made valuable enquiries and reports, one result of which was the passing of (Madras) Act II., of 1866, for the prevention of the spread of cattle disease. In the years preceding 1869, very bad outbreaks of disease in Upper India led to the appointment in that year of a Commission to investigate the whole subject, at the head of which was Mr. Haller, one of the ablest and most experienced veterinary surgeons in India. They carried on their enquiries, which extended to every province in India, throughout 1870, and in June, 1871, submitted a report which, with its appendices, runs to over 1,000 folio pages, and gives a most complete and exhaustive account of the history, location, causes, nature, and symptoms of Indian cattle diseases. This report was sent home, and was communicated to the Army Sanitary Commission, and their remarks, urging the improvement of the hygiene of Indian cattle rather than the stamping out of epidemics, on the principle "prevention is better than cure," were transmitted to the Government of India by Despatch (Sanitary), No. 27, of 1872.

I have not been able to trace the orders issued by the Government of India on the report of the Commission. But I may state that nearly everything that has been done in the matter since 1871 has been based more or less directly on their recommendations.

Those recommendations were, however, what I fear Mr. Fleming would consider very inadequate, as the Commission were much impressed with the difficulties of the subject. They were chiefly the ascertaining periodically the existing numbers and value of live stock, in order to know if stock is increasing or diminishing; early information as to outbreaks of cattle

disease ; prompt measures for its suppression on information of an outbreak being received ; segregation, as far as possible, of diseased animals ; diffusion of knowledge as to the causes of and remedies for disease ; the education of a skilled Native Veterinary Agency ; and legislation to enable such rules to be enforced as experience might prove practicable and useful.

Inoculation as a prophylactic against epidemic disease and *destruction of diseased animals*, were considered altogether out of the question.

The following are some of the chief measures that have been carried out since 1871 :—

(1) In most parts of India arrangements have been made for an annual or periodical census of stock. Lately there has been a good deal of correspondence on the subject of making this census as complete and accurate as possible.

(2) Information regarding the state of cattle disease is now regularly obtained, and is embodied in the weekly or fortnightly crop and weather reports of each district.

(3) When a bad outbreak occurs something is done to help the people, in the way of giving such veterinary aid as is procurable ; distributing advice and medicines ; insisting on the burial of carcases, etc., etc.

(4) In Bengal and Madras, and, I think, in other provinces, easy handbooks or primers on cattle diseases, their causes, prevention, and cure, have been prepared and widely circulated among the agricultural classes.

(5) Some progress has been made towards training a Native Veterinary Agency. In Madras, the pupils of the Agricultural College are taught veterinary science, with a special view to the treatment and prevention of cattle disease. These pupils come from and return to, all parts of western and southern India. In Burmah, a veterinary class described as "one of the most thriving institutions in the province," has been for some time established under professional instruction ; it is said that some of its pupils have already done good service in several places ; and it is expected that the knowledge of the proper treatment of cattle disease will thus be spread among the people. In the Punjab, a veterinary college has been established primarily for military purposes, but also for general instruction. Something of the sort has, I believe, been done in other provinces also, though I do not remember the particulars.

(6) As regards legislation, besides the Madras Act (II. of 1866), above referred to, a general Act (XX. of 1879) has been passed for the prevention of Glanders and Farcy amongst horses.

V. It is not, therefore, accurate to say that nothing has been done in India for the prevention of cattle disease. But I am far from affirming that what has been done is at all adequate to cope with the evil which has, I fear, diminished little since 1871, and Mr. Fleming's letters are particularly well-timed, now that the Agricultural Department, recommended by the Famine Commission, is in process of organization throughout India. He deserves, I submit, the thanks of the Secretary of State for drawing his attention to the subject, and although the question has doubtless not escaped the observation of Mr. Buck and other officers connected with the New Department, it will not be amiss to bring it specially to the notice of the Indian Government.

It is proposed, therefore, to send to India the following Despatch, drawing attention to the subject, directing that it shall be taken up by the New Agricultural Department, and asking what has been done, or what it is now proposed to do, upon the recommendations of the Commission of 1870.

And I think it may also be well to ask the Government to consider

whether those recommendations ought now to be accepted as in all respects authoritative. I believe that considerable progress has been made since 1870 in knowledge of the subject, and I am doubtful whether the best opinions would now concur in all the conclusions of the Commission. Two points particularly occur to me.

The Commission, as I have said, altogether rejected—for reasons which then appeared conclusive—inoculation as a prophylactic against Rinderpest and similar epidemic diseases. But recent researches of M. Pasteur seem to show that it may be possible to induce the disease in a modified and mild form with perfect safety, and with absolute security against subsequent infection. This discovery may prove invaluable in India, where, as I have shown, the ordinary measures for the prevention of epidemics are inapplicable.

Again, the Commission laid great stress on the *burial* of carcases of diseased animals, and this measure has, I believe, been enforced with much care since their report. But Mr. Darwin has lately proved that nothing is more likely to produce a fresh outbreak of the disease than cattle grazing upon places where diseased cattle have been buried.

In this paper I have said nothing about *Cattle Poisoning*, a subject which has rather a close connection with that of cattle diseases.

Despatch from Lord Hartington to the Governor-General of India.

India Office, London, 20*th April*, 1882.

To His Excellency The Most Honourable The Governor-General of India in Council.

My Lord Marquis,—Para. 1. Mr. Fleming, of the Veterinary Department, War Office, who is a high authority on the epidemic diseases of cattle, has brought to my notice the great prevalence of those diseases in India and the immense loss which they cause.

2. It appears to me that the present time is fitting to call the attention of your Excellency's Government to the subject, than which none deserves the earlier or more careful consideration of the Agricultural Department now being organised, in accordance with the recommendations of the Famine Commission, in several provinces as well as in your own secretariat.

3. I find that the question has received much attention from time to time, especially in the Madras Presidency, and that bad outbreaks of disease in Upper India in the years preceding 1869 led to the appointment of a Commission in that year to investigate the whole subject. Their very complete and exhaustive report, dated 30th June, 1871, was transmitted to this Office, and was, by the orders of my predecessor, communicated to the Army Sanitary Commission, whose remarks upon it were forwarded to the Government of India with Despatch (Sanitary) No. 27 of 1872.* Since then the Secretary of State does not appear to have been specially informed what steps have been taken to give effect to the recommendations of the Commission, although the frequent references to the subject of cattle disease in provincial administrative reports and other correspondence indicate that they have not been entirely lost sight of.

4. The principal recommendations of the Commission were as follow :—

(1) That the existing numbers and value of live stock should be periodically ascertained, with the view of detecting any extraordinary disease.

This recommendation appears to have been to a great extent carried out. In those provinces in which the necessary machinery exists, an annual or

* Dated 6th November, 1872.

periodical census of stock is taken. In a recent despatch* I have impressed upon the Government of Bombay the necessity of making these returns as accurate as possible, and I doubt not that this point will not escape the attention of the local Governments when dealing with the proposals of the Famine Commission† for the improvement of agricultural statistics.

(2) That early information should be furnished to the authorities of any outbreak of cattle disease.

Effect appears to have been given to this suggestion also. I observe that the weekly or fortnightly crop and weather reports of each district contain the information.

(3) That prompt measures should be taken for the suppression of any outbreak reported.

I have no information as to the orders in force upon this point, though various references from time to time in the proceedings of the different local Governments appear to indicate that it is not altogether overlooked.

(4) That diseased animals should, as far as possible, be isolated.

On this point also I have no information.

(5) That a knowledge of the causes of epidemic diseases and their remedies should be diffused among the agricultural classes.

It appears that some attempts had been made in Madras and in Bengal, probably also in other provinces, to give effect to the recommendation by the preparation and circulation of simple handbooks on cattle diseases.

(6) That a skilled native veterinary agency should be trained and posted to suitable localities.

Some efforts have been made—in Madras, in connection with the Agricultural College ; in Burmah, by the institution of a veterinary class ; in the Punjab, by general instruction given in the Military Veterinary College ; and perhaps in some other provinces—to give effect to this recommendation.

(7) That legislation should be undertaken with the view of enabling the local authorities to enforce such rules for the suppression of cattle disease as experience may prove to be practicable and useful.

With the exception of the Madras Act (II. of 1866) for the prevention of the spread of cattle disease (which was enacted before the date of the Commission's enquiries), and of the Glanders and Farcy Act (XX. of 1879), it does not appear that any legislation on the subject has been attempted.

5. I now request that your Excellency's Government will take the important questions of the prevalence of epidemic cattle disease, and of the possibility of diminishing it, into your early and careful consideration. And I desire to be informed, after such investigation and reference to the local Governments as may be requisite, what steps have as yet been taken, and what steps it is proposed to take, to give effect to the recommendations of the Commission of 1869.

6. With regard to the last proposal of the Commission, that for special legislation, it would appear desirable to ascertain to what extent the provisions of the Madras Act (II. of 1866) have been carried out in that Presidency, and what results they appear to have had in effecting its object, your Excellency will probably also think it desirable to consider whether all the conclusions of the Commission are in accordance with the present views of the highest authorities, as it is possible that some of them may require modification to bring them into harmony with the latest knowledge on the subject of cattle diseases. The Commission, for instance, laid great

* No. 46, Revenue, of 22nd December, 1881.
† Pages 40, 41, of Part I. of Famine Report.

stress on the importance of burial of carcases of diseased animals, but it has recently been ascertained that a fresh outbreak of Rinderpest is very likely to arise among cattle grazing where carcases of animals which died of that disease have been interred. Again, the Commission were entirely opposed to inoculation as a prophylactic against epidemic diseases, but the recent researches of M. Pasteur tend to show that it may be possible to induce the disease in a modified and mild form with perfect safety and complete security against subsequent infection. This discovery may prove invaluable in India, where the measures commonly used in Europe for the prevention or suppression of cattle epidemics, the destruction of infected animals, and the isolation of compromised herds or localities, are probably inadmissible or impracticable.

7. My attention has been called to the proceedings of the Government of the Punjab, of November, 1881, on the subject of the prevalence of cattle disease in parts of that province. These interesting papers, while they show that the subject has not escaped the attention of the local Governments, illustrate also its importance, and the difficulties involved in it. I would call your particular attention to the letter of Veterinary Surgeon Queripel, dated 12th August, 1881, and printed at p. 735 of the proceedings.

I have the honour to be,

My Lord Marquis,

Your Lordship's most obedient humble servant,

(Signed) HARTINGTON.

Proceedings of Veterinary Medical Societies, &c.

SCOTTISH METROPOLITAN VETERINARY MEDICAL SOCIETY.

A QUARTERLY meeting of this Society was held in the London Hotel, St. Andrew's Square, Edinburgh, on Wednesday, August 16th, the President of the Society, C. Cunningham, Esq., M.R.C.V.S., Slateford, in the chair. There were present Professors Williams, Walley, and Baird; C. Philips, Esq., V.S., 3rd Dragoon Guards; Messrs. Connachie, senr., Fairbairn, Fingzies, W. O. Williams, Hutton, Storrie, Young, Dalling, Cameron, Kirk, Manuel; some visitors, the representatives of the press, and the Secretary.

The minutes of the last meeting having been read and confirmed, the following gentlemen were elected members of the Society:—Henry Thompson, Esq., M.R.C.V.S., Aspatria; C. Hutton, Esq., M.R.C.V.S., Kelso; T. Connachie, Esq., M.R.C.V.S., Selkirk.

The Secretary (Mr. R. Rutherford) was appointed delegate to the Committee engaged in drawing up the Rules for the proposed British National Veterinary Association, and was empowered to appoint a substitute when unable himself to attend.

The SECRETARY intimated that the Scottish Central Society had agreed to join in the proposed annual meeting of the three Scottish Veterinary Medical Societies, and took occasion to say, that he hoped the movement would not fall through for lack of hearty support and attendance, as it was one which, by bringing members from all parts of Scotland together, was calculated in many ways to do a deal of good.

It was agreed that the first meeting should be held in Glasgow, the West of Scotland Society making the necessary arrangements.

Mr. CONNACHIE read the following notes of an outbreak of Pleuro-pneumonia.

Mr. President and Gentlemen,—Our indefatigable and worthy Secretary has asked me to relate the circumstances regarding an outbreak of contagious Pleuro-pneumonia which lately occurred in my practice, and knowing the great interest that he takes in all that relates to this disease, I consented to do so.

On the 15th of February last, when at Carterhaugh, the Home Farm on the estate of Bowhill, belonging to His Grace the Duke of Buccleuch, I was asked to look at a cow which was said to have suddenly gone off her milk that day. On examination I found her presenting the following symptoms. Dull appearance; dry, staring coat; short, quick breathing, with a hard, ringing cough. Pulse 75°, temperature 102°; bowels constipated. On auscultation, I found a loud rasping sound pervading both lungs, whilst she evinced no pain when percussion was applied. I pronounced the case to be acute Bronchitis.

On inquiry I was informed that the cow had been purchased, three days previously, at St. Boswell's Auction Mart, that she had calved that day, which was a very cold one, and that she was driven home a distance of fourteen miles. I concluded that she had caught cold, hence the Bronchitis. I administered a pint and a half of linseed oil, along with half an ordinary dose of Colic mixture, and applied a strong stimulating liniment to her chest. Next day I forwarded two doses of cough mixture, composed of Belladonna Solution, Ether, and Potassa Nitras. When back at Carterhaugh two days afterwards, I was informed that the cow was nearly all right, that she was eating well, and giving plenty of milk. On looking at her I observed that although she was very much better, her breathing was still considerably quickened, her coat still staring, with an occasional hard cough. I informed Mr. Reekie, the factor, that I was afraid that the cow had the seeds of Tuberculosis in her system, and advised him not to put her to the bull again. He resolved to take my advice. She continued to do well, so I did not require to see her again.

About the middle of March I was requested to go to Carterhaugh, to examine two cows, which I did, and found them presenting very similar symptoms to the former one. I inquired of the cowkeeper if there had been any change in their treatment, and he replied that there had been none, but that the night previously the byre door had been inadvertently left open, and the night being very stormy he found all the cows standing shivering from cold; but with the exception of these two all the others were all right again. As I began to suspect that I had something more than ordinary Bronchitis to do with, I took the precaution to have them isolated and put them through the same treatment that the first cow received. I also informed Mr. Reekie that if they did not appear better on my next visit, I would have one of them slaughtered to determine the true nature of the affection. This Mr. Reekie assented to. On my visiting them on the second day after, I was surprised to find both cows standing, chewing the cud, and looking as if little or nothing had been the matter with them, and I was informed that they were eating well and giving their milk freely. They were kept by themselves for a few days longer, when, appearing perfectly well, they were sent back to the byre beside the others. Although I was frequently at Carterhaugh I never required to look at the cows, till the 22nd of May, I was again called to examine two cows. After seeing them I was soon convinced that I had now to deal with true contagious Pleuro-pneumonia. Whereas none of the former animals presented any of the pathognomonic symptoms of Pleuro-pneumonia, they were fully developed in the cases before me, viz., back arched, knuckling over at the hind fetlocks, elbows turned out, breathing not so much quickened, but a peculiar quivering at the flanks, with a low muffled cough; signs of pain when pressed on the intercostal spaces; aus-

cultation revealing complete hepatization of the right lung ; temperature 105° and 107° respectively ; in fact, they presented a set of symptoms that when once seen are not easily forgotten. I at once arranged to have them slaughtered, which was done, and along with my son made a *post-mortem* examination on both carcases, and it was matter for surprise to both of us that such extensive lesions should have become developed in the short period that the animals had shown symptoms of being affected. The right lung of both of them had become completely consolidated and adherent to the costal pleura by false membrane, with great amount of exudate.

As the *post-mortem* had clearly revealed the true nature of the disease, and as there were other five cows which had shown no signs of being affected, I resolved to secure some pure lymph and try the effect of inoculation. Before doing so I took the temperature of each animal. To all outward appearance they were perfectly healthy, although the thermometer in the case of one of them indicated 102°. Four of the inoculated cases did well, became slightly fevered about the fifth day, with a considerable amount of swelling at the part of the tail where operated upon, with a slight formation of matter.

In the case of the fifth cow and the one whose temperature was 102°, she never exhibited any systemic disturbance, nor did the tail take on any of the inflammatory action that the others did, and on the 16th of June she began to show symptoms of Pleuro. With a temperature of 106°, she was at once slaughtered. The remaining four have continued to do well, and are now fit for the butcher ; the period of quarantine, fifty-six days, expires to-day, and I expect to have an opportunity of seeing them slaughtered, and will note the results.

I had been congratulating myself that I had now seen the end of the outbreak, when, on the 20th July, I was requested to go to Newark, about a mile and a half from Carterhaugh, but on the same estate, to examine the cow belonging to the shepherd there. After making an examination, I at once declared the disease to be Pleuro-pneumonia, and asked the owner if the cow had ever been near Carterhaugh ; he said no ; but he added that one of the Carterhaugh cows had been at Newark from the beginning to the 18th of April for the purpose of supplying milk during the lambing season. He said that the Carterhaugh cow was perfectly healthy the time that she was at Newark, and that he never heard her give the slightest cough. His own cow continued healthy till the 19th of July, when she seemed dull and unwilling to move. I was sent for, as I said before, on the 20th, and found her presenting the well-marked symptoms of Pleuro-pneumonia. I had her slaughtered, and the *post-mortem* revealed very extensive lesions, similar to those found in the Carterhaugh cows, the right lung in this case also being affected, a portion of which I here show you, preserved in spirit.

Although most of the older members of this association may have observed many similar outbreaks, I think that the above is not without interest, as it serves to prove how very insidiously the disease may be introduced among a herd ; because I have come to the conclusion that the cow purchased at St. Boswell's in February, and brought to Carterhaugh, must have had a very mild attack of Pleuro when she first came there, although it is contrary to all my previous experience, that three animals should become affected with Pleuro-pneumonia and recover in such short time, without almost any treatment, or at least with that of the very simplest kind.

The Newark cow becoming affected also goes to prove that a healthy animal, which has been in contact with diseased animals, may carry and communicate the disease to other animals.

With regard to the efficacy of the protection from, and suppression of outbreaks of Pleuro-pneumonia by inoculation, I have had only two opportunities of testing it, in both cases with very satisfactory results, and I hope

that Mr. Rutherford, our Secretary, notwithstanding the adverse criticism which he has received from those high in authority, will not rest until he obtains for it a place on the pages of the Contagious Diseases (Animals) Act of 1878.

Professor WALLEY related the history of a somewhat more serious outbreak of the same disease, which had lately occurred in Edinburgh, and which supported the theory of the disease spreading by indirect contagion.

[This outbreak was speedily put an end to by inoculation of the whole of the animals in the infected byres.]

The CHAIRMAN and several members commented on the very insidious manner in which the contagium may be conveyed and spread, referring specially to a cow which had that very day been exposed for sale in a full market, and which, on being slaughtered, was found to be badly affected with Pleuro-pneumonia.

The SECRETARY strongly supported the theory of the disease spreading by indirect contagion, knew many instances of it, and further expressed his belief that a great many cattle passed through the disease without being suspected, and in apparent health to an ordinary observer, were, nevertheless, capable of communicating the disease, as they frequently do to others.

Mr. CAMERON, Berwick-on-Tweed, read a paper giving a review of the Contagious Diseases (Animals) Act, and the provisions of clauses 15, 16, and 17 of the Animals Order, 1879. He passed some strictures thereon, condemning as inefficient the present system of disinfection, expressing a preference for the manner of doing so under the orders of a prior date. He referred to the "Swine Fever Order" as illustrating the continued neglect of disinfection; while the regulations affecting horse-boxes were inefficient, and even dangerous to human life. He suggested several alterations in the direction of more stringency in regard to cleansing and disinfecting, and thought the matter should be brought before the veterinary department of the Privy Council.

After some remarks from Professors Williams and Baird, the former of whom animadverted on the fact of many persons, not veterinary surgeons, filling positions on the working staff under the Act, who were quite unfit to do so, Mr. Cameron was requested to extend his paper, and bring it forward at some meeting more largely representative of the profession.

The CHAIRMAN, Principal WALLEY, the SECRETARY, and others gave descriptions of cases of interest, viz., case of Split Molar Teeth occurring one on either side of the jaw at one and the same time, the feature of interest being the occurrence of fracture in teeth on opposite sides at once, and which Mr. Cunningham has several times found to be the case. Cured by extraction. Case of large bird swallowing a pin: the treatment recommended by Professor Walley being diet of solid food, so as to get the pin surrounded until ejected. The case terminated as desired, the pin being passed surrounded by solid excreta. Case of severe paroxysmal roaring, death being imminent from spasmodic closure of the larynx: treatment, tracheotomy, which was performed when the horse had fallen and was apparently dying; recovery followed. This same horse was afterwards the subject of well-marked Equine Variola, the eruption extending more or less over the trunk, heels, and coronets (confluent), eyelids, lips, tongue, and just inside the nostrils. It ran its course favourably in about ten days; the treatment being good, soft food for a few days, Hypo-sulphite of Soda in water, an airy and strictly-cleaned loose-box, and sponging the body over with slightly carbolized tepid water. Although not completely isolated, no other cases occurred in a stable of forty horses.

The meeting separated with votes of thanks to Messrs. Connachie and Cameron, and to the Chairman for presiding.

R. RUTHERFORD, *Hon. Sec.*

LIVERPOOL VETERINARY MEDICAL ASSOCIATION.

THE seventy-second quarterly meeting of this Association was held at the Medical Institute, Hope Street, on Friday evening, August 11th, 1882, the President (William Leather, Esq.) in the chair. There were present—Messrs. Elam, Morgan, A. Leather, Kitchin, Bain, Donald, and W. Welsby, Liverpool; Greaves, Faulkner, A. Lawson, Wolstenholme, Hopkin and Crawford, Manchester; R. C. Edwards, Chester; W. Woods, junior, Wigan; J. Wilson, Nantwich; J. K. Pilkington, Woolton; and the Secretary. Letters, regretting their inability to attend, were received from Professors Williams and Walley, Messrs. W. Lewis, A. H. Darwell, M. J. Roberts, T. Taylor, S. Locke, and P. Taylor.

The minutes of the previous meeting were read and confirmed.

Mr. FAULKNER proposed Mr. Joseph Donald, Liverpool, as a member of this Association, seconded by Mr. Edwards, and carried.

Mr. PILKINGTON nominated Mr. Wilson, Nantwich; and Mr. ELAM nominated Mr. W. Welsby, Liverpool, as members of this Association.

The PRESIDENT drew attention to the circular issued by the "Fleming Testimonial Fund" Committee, in which the Presidents and Secretaries of Associations are requested to act as centres for their district, and intimated that the Secretary would be glad to receive subscriptions.

The SECRETARY read a letter from Mr. Banham, requesting the Association to elect another member to represent them on the Committee of the British National Veterinary Association.

Mr. ELAM proposed that the Secretary join the President in representing the Association on the Committee of the B.N.V.A., seconded by Mr. GREAVES, and carried unanimously.

The SECRETARY then read a letter to the President from Mr. MOTUM, Secretary Liverpool Branch of the R.S.P.C.A., in reference to Mr. Greaves' paper on "Cruelty to Animals and the Veterinary Surgeon's Duty," read at the last meeting. The President, Messrs. Elam, Greaves, Faulkner, A. Lawson, Pilkington, Wilson, and the Secretary took part in the discussion which followed.

Mr. GREAVES proposed that the best thanks of the Association be accorded to Mr. MOTUM for his able and interesting letter on Cruelty to Animals; this was seconded by Mr. ELAM, and carried unanimously. The usual vote of thanks to the President terminated the meeting.

J. W. P. MOORE, *Hon. Sec.*

WEST OF SCOTLAND VETERINARY MEDICAL ASSOCIATION.

THE usual quarterly meeting was held in the Lecture-room of the Veterinary College, Buccleuch Street, Glasgow, on 23rd August, 1882, at 3 p.m.

Present:—The President (Mr. Pottie) in the chair, Professor Walley, Edinburgh; Professors McCall and McQueen, Glasgow; Mr. Robinson, senior, Greenock; Macfarlane, Greenock; Douglas, Dunoon; Wyper, Partick; Taylor, Cathkin; Weir, Airdrie; McBride, Dickie, Mitchell, Weir, Anderson, junior, and the Secretary, Glasgow.

The PRESIDENT then called on Professor Walley, the essayist for the evening.

Aspirator and Concealed Bistoury, Saws, etc.

The Professor (before reading his paper) directed the attention of the members to the fact that some time ago he submitted for their inspection a

large ecraseur made on the screw principle, which could also be used for the purpose of concealing bistouries, saws, etc., for operations on such organs as the rectum, uterus, mouth, larynx, or nostrils. Finding that the screw acted unsatisfactorily as an ecraseur, he had, with the assistance of Mr. Tennant, instrument maker, of Edinburgh, devised the instrument now submitted for their examination.

The instrument was a greatly enlarged Chassaignac ecraseur, fitted with a small and large chain, the cutting edge of which was serrated, and a twisted wire, and so arranged as to be easily fitted with bistouries, saws, or other instruments as desired.

Compound Speculum Dilator, Retractor, and Concealed Bistoury.

Professor WALLEY in introducing this instrument to the notice of the members, observed that all must occasionally have felt, when performing such operations as neurotomy and tracheotomy, the necessity of a convenient retractor. He thought the instrument before them supplied that want. As it was only a model, it was perhaps too small for some purposes, such as a speculum or bistoury, but it could be made much larger and stronger, and at the same time be utilized for the more delicate operations ; it was also fitted with a rack so as to regulate the movements and keep it in a definite position when required.

The purposes for which it could be utilized were (1) as a retractor in operations upon the eyelids, etc., being fitted with sharp and blunt hooks and forceps, with this object ; (2) as a dilator of the nostrils, vulva, or anus ; (3) as a speculum ; (4) as a concealed bistoury.

He then read the following essay :—

Mr. President and Gentlemen,—The subject-matter of my discourse to-day is not one—it may be thought—quite suited to an audience mainly composed of citizen veterinary surgeons. I have chosen the subject of "Diseases of Sheep" for three reasons : (1) because I thought it would be a little variation from your ordinary routine ; (2) because I am desirous of rousing the attention of my brother practitioners to the diseases of animals which claim equally as much their care and assistance as do the larger and on the whole more valuable animals with which they are more accustomed to deal ; and (3) because in various ways the subject has attracted more attention of late amongst sheep-breeders than it did formerly. Farmers, curiously enough, have in regard to the diseases of sheep assumed in the past very much the position of *fatalists*—the death of a sheep has been received with only a limited amount of interest, and indeed with some degree of callousness, as it was thought that nothing could be done for such animals. Since I have occupied the chair of Cattle Pathology in the Edinburgh Veterinary College (a period of some twelve years), I have annually impressed upon the minds of the members of my class the necessity—when located in rural districts—of studying the diseases not only of sheep, but of other and less important domestic animals, such as pigs and poultry, and I am happy to say that in many instances the advice given has been accepted with the result that these young practitioners have not only thereby improved their own position in the localities in which their lot has been cast, but have been enabled to arrest many outbreaks of ovine and other diseases, and have thus materially benefited those who have employed them.

The result of the supineness to which I have alluded is strikingly brought out in the confusion which exists as to the nomenclature of ovine diseases, half a dozen different diseases being designated by one and the same synonym, thus—"*Inflammation*," "*Sickness*," "*Thorter or Thwarter-ill*," "*Joint and Louping-ill*," "*Milk Fever*," and "*Braxy*," from the vocabulary of those

who pretend to any knowledge of the disorders of sheep in this country. It is worthy of remark that, with the exception of one or two, none of the terms employed convey to the mind any idea of the pathology of the disorders to which they are applied.

As I have before stated, the consideration of the diseases of sheep has lately from various causes received a marked impulse, and, as a consequence, the thoughts of men have been directed into the groove of the fashionable germ-theory, and facts otherwise of easy explanation have been twisted and manipulated in such a manner as to support the theories which have been promulgated.

It may be as well that I should say at the outset that so far as I can at present see, there is only one ovine malady of any consequence that requires the intervention of the germ-theory to elucidate its nature and origin—that disease is Anthrax Fever, or what is very often called Red Braxy. With this exception, the causation of all the more common diseases is the same, viz., *mismanagement* and *faulty dieting*, resulting in an altered, deteriorated, or depraved condition of the blood, thereby rendering animals more susceptible to the influence of adverse circumstances, and more prone to contract diseases from which they would otherwise have enjoyed perfect immunity.

I have said that ovine diseases are most largely due to two sets of causes. I should have added to those a third, viz., the lowering influence of the ravages of parasites, to which especially Water Braxy—Dropsy—can often be traced; and while I have not found intestinal or bronchial entozoa to exist in such large numbers in sheep in Scotland as in England, it has not unfrequently happened that when called upon to investigate an outbreak of disease of an anæmic and dropsical character, I have been able satisfactorily to trace its production to the effects of either intestinal or bronchial parasites, or both, and to advise the adoption of methods of treatment which have been highly successful in arresting the progress of the malady.

I need not, I think, point out to you in detail the various influences which modify the conditions of the blood of animals, except in so far as is necessary to the proper consideration of the subject with which I have undertaken to deal. Before doing this, however, I may remark that there are several circumstances peculiar to the sheep which operate somewhat against its welfare, the most prominent of these being its manner of prehension, and the influence of its fleece. Admirably as the cleft upper lip of the sheep facilitates the prehension of food, and enables this animal to live where others of a different species would starve, it nevertheless operates as a source of danger by enabling it to bite close to the roots of the herbage upon which it is feeding, and of thus picking up matter of a deleterious character in much larger quantities than would animals, as the ox, in which prehension is mainly accomplished by the tongue. Again, admirably as the fleece is calculated to protect its wearer against the effects of cold, it becomes a prolific source of mischief when cold and wet are combined, and there is perhaps no fact better proven than this—*that sheep will stand any amount of cold, but they cannot resist the combined influences of cold and wet*—and the reason is not far to seek.

The horse, the ox, and other short-coated animals can readily shake off a large amount of moisture from their coats, and evaporation goes on very rapidly. Not so, however, with the sheep; once the fleece becomes saturated with moisture, a long time must elapse before it can again become dry, and this condition is often aggravated by the wool becoming matted together by masses of dirt, particularly when sheep are feeding on turnips in dirty weather, and on clay lands in the winter; it is also further aggregated together by frozen snow and dirt. The skin glands of the sheep are far more active than those of other animals, and doubtless the quantity of sebaceous

matter secreted is much greater, and so far the skin itself may be better protected; but I think it will be readily acceded that this cutaneous activity may and does constitute a source of danger when anything arises to suppress its normal secretions—such suppressive influences you have in sickness, and in cold combined with moisture and dirt. That free cutaneous transpiration and respiration is as necessary to the well-being of the sheep as to other animals, is shown by the effects of the too long retention in contact with the skin of the living of the pelt of the dead lamb in the case of affiliation, the little victim dying under these circumstances from apnœa. Prolonged interference with the functions of the skin leads to another important condition, viz., *organic disease of the kidneys*, a condition often found to obtain in Water Braxy, the renal derangement being vicarious to the suppressed cutaneous function. In reference to the ready manner with which the blood, and even the textures of the blood-vessels, are altered, I may direct your attention to the physical effects of the introduction into the circulation of various chemical agents, such as saline and metallic salts, organic germs, septic material, and even water. These effects are the perfect and permanent solution of the colloids, the diminution in activity of the white cells, the dissolution of the red; and the weakening of the walls of the blood-vessels; and as a consequence, systemic and local effusions and extravasations —even excess of cold, it has been shown, will sometimes produce similar results, and organic disease of the more important glands, as the lungs, liver, and kidneys, is a prolific source of blood deterioration and depravation. While such influences as those above mentioned are observed to result from excess of saline and mineral matters, it is in the opposite direction equally true that deficiency in such agents as are absolutely necessary for the building up of the tissues, the preservation of the fluidity of the blood, and the manufacture of the normal secretions, leads to very various and important dyscrasias—excess in one direction, deficiency in the other, producing identical results.

A knowledge of physiology is necessary to enable the stock-breeder and feeder to apply intelligent rules to the feeding and management of his stock; unfortunately this knowledge is not widely distributed amongst this class of men; and much as the necessity of some chemical knowledge to the agriculturist has been recently insisted upon, I hold that some acquaintance with physiology is equally if not more necessary to him, in order that the animals under his care shall be profitably and properly managed.

Animals by most men are looked upon too much as of the nature of machines or of steam-engines; the intricate nature and delicate textures of the various organs are overlooked, and they are submitted to such a high degree of pressure that, like the steam-engine, they frequently yield to the strain put upon them, and the results are of a disastrous character alike to the animals themselves and their owners.

In some cases you will find men forcing their animals with injudicious quantities of food of a highly carbonaceous and nitrogenous character, such as cake and corn, with the not unfrequent result that the blood becomes overladen with fat and flesh-forming elements, assimilation and transformation are imperfectly performed, important organs, such as the liver, become congested, and fail in the due performance of their functions; adverse influences, such as over-exertion, excitement, parturition, sudden alternations of weather, are brought to bear upon such systems, with the result that death is quickly produced by congestion or inflammation of the lungs or some other vascular organ—"Inflammation." On the other hand, animals are placed upon an unlimited supply of food rich in sugar; fatty infiltration and transformation of the liver cells takes place, large quantities of fat accumulate in the system, the functional power of the liver is annihilated, and death results from a very

important alteration in the blood—*anæmia*—"Sickness." Again, food grown with excess of saline matter or phosphates, and probably at the same time surcharged with moisture, is allowed *ad libitum*, with the result that the blood and the blood-vessels are acted upon in the same way as in the case of experimental introduction of such agents directly into the circulation. Lastly, with others who think that any food is good enough for animals, materials contaminated with decomposing matter, or in a state of chemical change themselves—as decomposing turnips, moss, or other vegetable matter—are used as food, and the result is blood depravation and deterioration.

In many instances, I grant, the fault does not lie so much in the physiological ignorance of the stock-raiser as in the nature of the soil and herbage upon which his animals are depastured, and indifference to or ignorance of the effects of the application of manures. Herein, indeed, we have a frequent and unsuspected source of disease, and who is not aware of the fact that maladies previously unknown on a farm often make their appearance after the injudicious application of the different fertilizers in use, or the adoption of some different system of agriculture than that which has previously obtained? The knife here, it may be said, cuts both ways, as it is a fact equally well known that very frequently the adoption of such measures as those to which I have just referred, leads to the diminution in the number of cases of disease, and often to its total suppression or prevention. Again, the stock-breeder does not always recognise the necessity that exists for an occasional change of food in order that his animals shall grow and thrive, sheep especially being kept for a long period upon pastures for the improvement of which no measures have been adopted, it may be for generations. This lesson was taught me very early in life, as in the case of the farm upon which I was born, the losses in sheep were comparatively very trifling so long as a naturnl system of agriculture was followed, and so long as judicious changes of food were procured by the purchase of small fields of turnips, and of grazing from neighbouring farmers; but immediately these conditions were reversed, and it was thought that the farm should be made to carry its own stock, the mortality became, and for some time continued, very great. This, too, I know is a tolerably universal experience in all parts of the kingdom. Now, gentlemen, having made these preliminary observations, let us see how far the statements I have made are borne out by practical experience.

It must be noted in the first place that the list of diseases which I gave in the early part of this paper includes, with one or two exceptions, all the more important maladies; these exceptions we shall briefly refer to. They are—1. *Sturdy*, a parasitic disease, due entirely for its production upon the existence of the hydatid of the tænia cænurus cerebralis of the dog, in the cavity of the cranium, or in the brain itself. It has been said if we know the habits of an enemy we know how to encompass him, and perhaps destroy him. This is largely true with regard to disease, and yet we have here a malady, the cause of which is patent, the prevention of which is or should be easy, allowed to go on year after year claiming its holocaust of victims. What is the reason? is it ignorance or indifference, or what? It is certain the hydatid could never be brought into being, except it had a progenitor in the shape of the tapeworm of a dog; it is equally certain that the latter could not exist without the former. Which is the easier to deal with, the hydatid or its progenitor? Manifestly the former, for we know its *habitat*, we can seek for it and effectually destroy it; but we cannot dispense with the aid of dogs in the manipulation of our flocks and herds, and vermicides frequently fail to expel the whole of the worm from the intestines of its host, and even if we succeeded in doing so, it would become a source of danger, as we cannot prevent it finding its way into the land.

Now, in the case of the hydatid, what more easy to accomplish than the careful and effectual destruction of the head of every sheep which manifests the slightest symptom of Sturdy, instead of, as is too frequently the case, allowing the head to be sold, and after it is split open, the "bleb" to be extracted and thrown to dogs, or amongst the refuse! I say this proceeding is either begotten of ignorance or indifference, and as a result of it the disease is perpetuated.

Two other parasitic diseases which in various parts of the country annually claim their quota of victims are *Rot* and *Hoose*, both of them almost as easy to deal with as Sturdy, but both allowed to run their destructive course unchecked. I have stated on many occasions that Rot at least should be dealt with by the Legislature, and until it is, the scourge will not be got rid of, though stockowners have the means of prevention largely in their own hands, and very much may be done by the drainage and cultivation for a year or two of contaminated lands, the use of vermicide top-dressings and manures, the allowance of tolerable quantities of salt, the slaughter of affected animals, and the careful destruction of the whole of the intestines and the liver, instead of allowing the ova of the fluke to find their way in myriads into the sewers or on to the dunghill.

Malignant Enzootic or Epizootic Catarrh.—Sheep are from much the same causes as other animals very frequently the subjects of simple Catarrh—the affection running its course without much damage to the system, but in very changeable (what we might call epizootic) seasons, and in cold, wet pastures, more particularly in hill districts, the disease takes on a very malignant character. The fever is extreme, the submaxillary and neighbouring groups of lymphatic glands become the seat of inflammation, and suppurate; the nasal membrane tumefied, and finally ulcerated; nasal hæmorrhage is frequent, blood-poisoning with all its concomitant conditions, results, or death is produced by exhaustion, by asphyxia or inability to swallow; and in those animals which rally from the primary fever, death is frequently produced secondarily by pyæmia, *i.e.*, the formation of multiple abcesses in the lungs and all along the course of the facial and cervical lymphatic vessels, with their associated glands. This affection is sometimes produced both in sheep and cattle by exposure to the foul air of the holds of ships in bad weather, or where the ventilation is deficient.

Thrush.—Of this disease we also have two types, viz., the *mild* and *malignant*. Attributed by most authorities to a fungus, the *Oidium Albicans* both these affections are frequently due to dietetic irregularities and exposure to cold and wet, and when occurring, as they frequently do, in lambs, to a depraved condition of the mother's milk. Very simple treatment suffices for the combating of the mild form, which is the analogue of Thrush in the human subject; but in the case of the malignant, death is the result in the very great majority of cases, the blood becoming absolutely depraved, and the buccal and gingival ulceration taking on a very destructive character, the teeth being frequently forced out of the alveolæ by rapidly growing granulations. Professor Simonds, in his Cattle Pathology lectures, used to point out several important facts in connection with this disease, viz., that in the udders of the ewes pustular eruptions were sometimes developed simultaneously with the buccal eruptions in the lambs; that effusions of sero-sanguineous fluid were found in the inter-muscular connective tissue of the ewes, and that the disease sometimes made its appearance in peaty lands recently top-dressed with marl. Professor Axe some time ago recorded cases which he thought had been produced by succulent vetches largely infested with caterpillars or some such-like creatures.

In the causation of the disease, we have the key to its treatment and prevention.

Abortion is in some districts and in some seasons the bane of the sheep and the cattle breeder alike, and is frequently produced by ergoted grass-seeds. Independently, however, of this cause, we have others of a more general nature, such as improper or irregular dieting, over-stocking, fright, over-exertion, and exposure.

Some sheep-breeders seem to treat their lambing ewes like machines—feeding them generously during the rutting season, and as the period of gestation draws to a close, and half-starving them in the intermediate period. Such treatment is, to say the least of it, highly injudicious, quite contrary to all natural laws, and very frequently the cause of great loss, more especially where the ewes have been kept mainly on succulent turnips without a sufficient admixture of nitrogenous food. If there is one period of the life of a breeding animal during which an uniform and judicious management is called for, it is the period of utero-gestation, as animals are then highly susceptible to disease and readily acted upon by adverse influences, and the delicate bond existing between the mother and the fœtus is easily severed.

In reference to the more generally recognised diseases of sheep, it is necessary that to them I should devote a little more attention than I have bestowed on those to which I have just referred.

One of the most common terms applied to the diseases of sheep in this country is "Braxy." What the precise derivation of the term is I cannot pretend to say, and its significance is reduced to a minimum by the fact that several diseases presenting totally different characters are, in different districts, recognised as Braxy: thus we have "Red," "Water," and "Turnip Braxy." The term Red Braxy is, as I have already indicated, applied to those cases in which animals die in a comparatively short space of time, and in which after death the tissues or organs, or both, are the seat of violent congestion, or of extravasation of blood, giving them a red colour and an inflamed appearance. Now, while there is no doubt that in very many cases the lesions are due, purely and simply, to an altered (physiological, physical, and chemical) blood crasis, owing to which the coats of the blood-vessels become weakened, and the physical bond existing between the different constituents of the blood becomes loosened, requiring only some slight disturbing cause to bring about a complete upset in their equilibrium, there are numbers of instances in which the term "Braxy" does duty for Anthrax Fever—a disease, as you all know, due to or associated with a specific organism, *Bacillus anthracis*, —and from which, owing to the general similarity in their lesions, it could only be distinguished by the microscope, and by inoculation; and even the latter test may be fallacious, as the blood in Braxy may be in such a condition as to induce a virulent form of Septicæmia, the lesions of which would conform largely in their general characters to those of Anthrax Fever. In England similar conditions are noticed, especially where animals are thriving rapidly, or when fed largely on turnips, the lesions assuming indifferently the characters of Black-quarter or Purpura and in most districts the victims are said to be suffering from *Blood-striking;* while Professor Simonds, in his Cattle Pathology lectures, used to apply to some of the cases the terms *Hœmatozymosis* or *Hœmatosepsis*, according to the condition of the blood and lesions. In all these cases it is observed—as in Scotland—that pregnacy acts as a predisposing, and parturition as an exciting, cause to the development of the lesions.

In breeding ewes, in Scotland, the term *Milk Fever* is applied to a disease identical in every respect with Red Braxy, except that from the deteriorated and depraved condition of the blood we have as a concomitant, erysipelatous inflammation of the womb and the udder.

In a paper on Joint-ill, read before the Scottish Metropolitan Association in June, 1876, I pointed out that the so-called Milk Fever—which I termed

Malignant Parturient Fever—was frequently associated with Joint-ill; was always caused by faulty dieting, such as keeping ewes exclusively on turnips (especially if grown with a superabundance of phosphatic manures); and was easily suppressed by change of treatment, dietetically, and the administration of alterative medicines. Further, I may here call attention to the supposed contagious nature of this form of Braxy. I say supposed, because I have on several occasions been able to point out that the disease occurs only in one particular lot of breeding ewes in a flock which has been subjected to the course of dieting indicated; while another lot, in which a different system of dieting has been adopted, has entirely escaped, even though the same shepherd has had the management of the whole. It must, however, be borne in mind that a shepherd, whose hands have been imbued in the decomposing discharges from the uterus of a sheep with a dead lamb may, by inoculation, induce Septicæmia in a healthy ewe.

In some cases of so-called *Turnip Braxy* we find after death universal effusion, the serum being highly charged with albuminous matter, so much so as to produce a glaze or varnish over the cut surface of the muscles when exposed to the atmosphere—the flesh in such cases is not only nutritious, but absolutely innocuous.

Water Braxy—Sickness—is in reality nothing more nor less than *Dropsy*, induced by food deficient in nutritive matter, and rich in salines or water, combined with long-continued wet and cold weather, the moisture acting upon the fleece in the way already indicated in the early part of this paper. The indications for its suppression are the administration of laxatives followed by restoratives—particularly iron and salt to combat the anæmia—nutrient diet, and dry bed and shelter. Several years ago I dealt successfully with one of the best flocks of sheep in East Lothian which were suffering to an alarming extent from water braxy.

Another dietetic disease—*Joint-ill*—is of vast importance to the sheep-breeder, and, indeed, in some districts to the breeder of cattle also. Inasmuch as I dealt at length with this disease in the paper already alluded to, read in Edinburgh in June, 1876, and published in the *Veterinary Journal* and *N.B. Agriculturist*, I do not intend to refer to the matter here further than to say that the opinions I then expressed as to its nature and pathology have not been altered but rather confirmed by subsequent experience, and confirmed too in a most remarkable manner by the testimony of Professor Robertson in the paper read by him at a meeting of the Scottish Metropolitan Association in September, 1878, and in which he showed that the disease could be experimentally produced by dieting.

Two other diseases closely allied to Joint-ill in their causation and results, and which in fact are often associated with it, are *Rickets* and *Softening of the Bones*—conditions owing their origin to faulty dieting, *i.e.*, to a deficiency in the food of the elements necessary for the building up of the hard tissues of the body, and marked by deformity and distortion of the limbs, dropsy of the head, and elongation of the ligaments and tendons, with dislocation of the joints, luxation of floating bones, and softening of the bone tissue. This, too, is a disease easy of suppression and of prevention by the adoption of a different system of agriculture and altering the general management of the ewes.

Lastly, allow me to direct your attention to these diseases in which the lesions are most markedly observed in connection with the great nerve centres—the brain and spinal cord. Of these, *Louping-ill* and *Swung Back* are of the greatest importance; the other two recognised forms of disease of the nervous system—*Thorter-ill* and *Trembles*—being of secondary importance, and often indeed only symptomatic of a deranged condition of the nerve centres, the former frequently being confounded with Sturdy when the hydatid

is located in the spine, the latter with the weakness which results from anæmia and debility.

Swung Back—"Paralysis of the hind-quarters," "Paraplegia"—has been far more common during the last season in the neighbourhood of Edinburgh than usual; great numbers of lambs having been brought into the different auction marts of the city in a very helpless and pitiable condition, and often in the last stage of inanition. Looking back only at the apparently favourable winter and spring we have enjoyed, we might be inclined to wonder why such cases have been so numerous, but a little reflection will lead to the conclusion that the conditions of these seasons have not been so favourable as would at first sight appear. As in the first instance animals, owing to the open weather, were allowed very small quantities, often none, of artificial food, and we all know the innutritious nature of winter herbage, no matter how plentiful it may be; and the spring herbage, though abundant from the nature of the season, was largely charged with moisture, and consequently innutritious; moreover, east and north-east winds were very prevalent throughout the spring: all these combined influences are pre-eminently calculated to produce an impoverished condition of the blood, and to lower the vital powers, and thus to produce congestion of delicate organs (such as the covering of the spinal cord) and effusion—the usual pathological conditions discovered in autopsy in these cases.

In referring to Louping-ill I know I am considering a disease of protean characters, *i.e.*, if we accept the very varying descriptions given of it by practical men, and equally protean in its causes. I think I need not point out to you the prominent position this disease has occupied of late in the general discussions which have taken place in different parts of the country on the diseases of sheep, and you have recently had a lecture delivered in this city on the subject by Professor Williams. I have said that Louping-ill possesses, according to general description, protean characters; by this I mean that if you ask a given number of practical men what they mean by Louping-ill, you will probably get an equal number of diverse answers. In some districts, however, as in Roxburghshire, tolerable uniformity of opinion on this point exists, and it is understood to apply to a form of disease in which there are marked symptoms of constitutional disturbance with, at the outset, more or less loss of power of one or both hind or fore limbs, great nervous perturbation on exciting the patient, and after a time complete paralysis with rapid wasting and probably disease of one or more joints, and the formation of abscesses in the more prominent parts of the body.

On *post-mortem* examination certain changes in the spinal cord or brain, or in their meninges, such as congestion of the blood-vessels, softening of the cord, thickening of the meninges, and effusion of serum (coagulating after death into a gelatinoid, imperfect clot), are observed; these changes being the result of inflammation, or probably of simple congestion, with weakening of the walls of the capillaries. The joint lesions are very similar to, sometimes identical with, those seen in Joint-ill, while the abscesses are the result of extravasation of unhealthy blood—their existence in the more prominent parts of the body being easily accounted for by the pressure to which such parts are subjected.

That the disease should be so largely fatal is easily understood when we look at the tissues in which its lesions are localized; that lambs should be affected simultaneously with or subsequent to the ewes is natural, seeing that the milk of the latter must be of a very inferior, and probably of a very deleterious, quality.

I have said that the causes of the disease are very various. It has been attributed to indigestion, to innutritious food, to the prevalence of east and north-east winds, to ergoted grass-seeds, to peculiarities of soil, and to ticks.

And I must here confess that it is sometimes difficult to reconcile the many statements that are made on this point, and impossible to devote sufficient time to the analysis of each. I can only refer to the different theories entertained very briefly. In reference to indigestion, it is a well-known fact that in no animal is nervous derangement so markedly dependent upon, and so readily produced by, gastric disturbance, as in the ruminant; it is illustrated in the great nervous excitement, and oftentimes paralysis, which accompanies gastric indigestion or irritation in cattle; it is seen in the passage of foreign bodies through the stomachs of cows, in distension of the rumen with food and gas, and in gastritis and enteritis, no matter how they may have been induced. I have seen the goat (a creature closely allied to sheep) show every known form of nervous derangement—epilepsy, paralysis, lock-jaw, delirium, coma—when suffering from constipation of the bowels or gastric derangement; and I some time ago drew particular attention to this, as it occurs in cattle, in a paper on gastric derangement in this animal, read before the Scottish Metropolitan Association. In sheep I have seen similar conditions produced under like circumstances, and on *post-mortem* in each of these animals we find either marked cerebro-spinal congestion or effusion.

The ergot theory had at first sight an appearance of feasibility, but the practical tests to which it was subjected by Mr. Webster, of Hawick, effectually, I think, disposed of it, at least in so far as its being the great cause, or even a separate factor in the production of the disease. The inquiry, however, was not without value. It served to show to what an enormous extent ergotism exists, Mr. Brotherstone pointing out that he had found it in no less than twenty-three different grasses. That ergot, when abundant, must exercise a very deleterious influence upon animals (even upon horses and cattle) there can scarcely be any doubt.

Ticks have always been associated more or less closely with the etiology of Louping-ill. They have for a long time been looked upon as an actual cause by many people, as a mere coincidence by some, and as a predisposing and exciting cause by others. My opinion was expressed on this point in answer to queries furnished by the Teviotdale Farmers' Club some time ago, to the effect "that the presence of tick was a mere coincidence, but that when existing in large numbers it was easy to see they would, by inducing debility, act as a predisposing, and by irritation as an existing, cause, to the development of the disease." Professor Robertson, in reference to this matter, expressed the opinion "that it was possible—supposing such to exist—they would act as carriers of disease-germs from one animal to another, but he failed to see how they could of themselves act as an actual cause in the production of such a disease as Louping-ill." This opinion is only in accordance with what we know as to the germ-carrying powers of all carnivorous or blood-feeding insects—*i.e.* assuming that a specific germ exists. While most of us look upon the tick in the light above mentioned, Professor Williams in his paper (and I may here observe that I am only judging from newspaper reports, as I was not aware when his essay was to be read, and consequently was not present to hear it) seems to assign a more important *rôle* to this little creature, for he says "that not only has he found a certain organism in the gelatinous effusion in the neural canal of the Louping-ill sheep, but that he has found a similar organism in the tick—*whether removed from diseased or healthy sheep.*" I have italicized the last few words, as they are condemnatory, I think, of the whole theory, as if present in healthy sheep, where did the organisms come from—diseased sheep, I suppose? In answer to this, I may observe that *Louping-ill exists where there are no ticks;* and so far as I know of the habits of these little creatures they are only found in the sheep for a limited period—viz., until

they are replete with blood, when they voluntarily loose their hold upon the skin and fall upon the grass, there remaining until the whole of their sanguiferous meal is digested. Moreover, it is recorded by Professor Simonds and others, that in the years 1869-72 a plague of ticks was experienced in Kent, but no Louping-ill is mentioned, nor did it exist. Further, in connection with this matter of specific organisms in the effused spinal fluid of Louping-ill, I may observe that I have not been able to discover such, that Mr. Geddes failed in discovering them, and ordinary organisms can only be looked upon in the same light as the organisms described by numerous pathologists in very varied and unnumbered pathological productions; most certainly, if a special organism exists and is the cause of the disease, we can understand how the tick (why not the Red and the flesh fly also?) could become a carrier of the germs; but mere assertions in such matters as these cannot be accepted as truths until determined satisfactorily by properly conducted experiments. That ticks should exist in lands where Louping-ill is seen is not remarkable, seeing that the soil and situations in most cases are favourable alike to the development of the former and to the production of the latter. Lastly, in reference to ticks, I may observe that Louping-ill is often seen in the autumnal months, ticks rarely—even in situations where they abound in the spring; and I have in my possession at the present moment a lamb, procured for me some time ago by Mr. James Pow, M.R.C.V.S., from the Liddesdale district, that exhibited all the symptoms of Louping-ill with Joint-ill combined, in the skin of which not a tick was to be found.

While giving ticks a place in the causation of the disease, I cannot, for a moment, in the present state of our knowledge, agree to assign to them the important position claimed by Professor Williams.

From my previous knowledge of the disease, from the facts set forth in the published report on "Louping-ill" of the Teviotdale Farmers' Club, with the discussion which took place at a meeting of that society as the result of the remarks made by Mr. Aitchison on submitting that report to the consideration of its members, coupled with the opportunities I have recently had afforded to me (by the kindness of Sir Walter Elliot, of Wolflee, Mr. Pow, Mr. Carruthers, of Hindlee, Mr. Elliot, of Wolfhopelee, and others) of inquiring into the matter, I am forced to the conclusion that the disease is due to a combination of causes—pre-eminently calculated to bring about such results—as indigestible and innutritious food, deficient supply of food, over-stocking, the lowering effects of changeable weather and exposure with, in some instances, the irritation and debility produced by ticks; that these causes produce a deteriorated condition of the blood, and, as a result, imperfect nutrition of the cell structure of the great nerve-centres, leading to Congestion or Inflammation or passive Dropsy of these centres or their coverings. If we look closely into the matter we find that improved cultivation of the land—such as eating of the old fog and benty grass and moss by cattle, or burning it; liming, and in some instances draining the land—has frequently been the means of preventing attacks of this disease; and I am satisfied that if the measures above alluded to (with a tolerable allowance of salt, and, where necessary, of artificial food, and as far as practicable protection from extremes of weather) were judiciously adopted, we should hear much less of the ravages of Louping-ill than we now do. As to the therapeutics of the affection, good cows' milk, in lambs, blood remedies such as iron compounds—Parrish's syrup *par excellence*—chlorate of potash, salicylate of soda, with absorbents and the application of stimulants over the region of the spine, and attention to the bowels, are indicated. Ticks also should be destroyed, or their attacks prevented by the application of tarry compounds to the skin.

I am aware, Mr. President and gentlemen, that this paper is of a fragmentary and imperfect character, and that it does not deal exhaustively with any one of the subjects to which I have alluded; and so far I owe you an apology, qualified, however, by the remark that my object in writing it has been rather to stimulate my professional brethren in this great sheep-breeding country to take a little more interest in matters connected with the production and prevention of ovine diseases, and thus assist in benefiting the community at large. A further object I have had in view is that of directing the attention of sheep-breeders to the necessity which exists of themselves seeking for the causes of disease amongst material agencies and influences, and not to allow themselves to be led astray by shadows while the substance lies within reach of their grasp; and when they have found the causes, to use a little energy in their removal. I cannot close without briefly calling your attention to a proceeding which has been brought more under my observation during the present than in any previous season, viz., the cruelties which are practised by stock-owners (largely as the result of ignorance, doubtless, but I am afraid very frequently from indifference also) in keeping diseased animals lingering about in misery and suffering from week to week, and in finally sending them into the various auction marts to be sold, after being knocked about and trampled upon by other animals for hours together. The sights of this description sometimes seen are deplorable, disgraceful, and melancholy; it were surely better, where an animal is seized with an illness from which it is not likely to recover, to slaughter it at once, and utilize its flesh, than to keep it until it becomes a living skeleton, and absolutely useless for any purpose save, perhaps, that to which the carcases of many of these poor creatures are consigned—that of manufacturing mutton pies, saveloys, polonies, or other such like delicacies.

After the reading of the paper, the President suggested that as it was a very important subject, he would move that the discussion be deferred till next meeting.

A vote of thanks to the essayist and President terminated the meeting.

GEORGE C. HILL, *Secretary.*

Army Veterinary Department.

Gazette, September 22nd.

Inspecting Veterinary Surgeon James J. Meyrick, to have the local rank of Principal Veterinary Surgeon while employed in Egypt.

The following Veterinary Surgeons of the First Class, to have the local rank of Inspecting Veterinary Surgeons while employed in Egypt:—Walter Burt, Francis Walker.

Notes and News.

ANTHRAX EXPERIMENTS.—The French Minister of Agriculture has placed a further sum of 50,000 fr. at the disposal of M. Pasteur for his scientific researches into the contagious diseases of animals. The illustrious *savant* had already received grants of 50,000 fr. in 1880 and 40,000 fr. in 1881.

VETERINARY HONOURS.—Our colleague, H. Zundel, of Alsace, has been elected an Honorary Member of the Brussels Academy of Medicine, and has also been made a Chevalier of the Oak-crown of the Netherlands. The Acclimatisation Society of Paris has awarded a prize of 500 francs to Dr. Harz, of the Munich Veterinary School, for his researches into the destructive

disease attacking cray fish, a notice of which has already appeared in this journal.

THE BERLIN VETERINARY SCHOOL.—The German Government has granted the sum of 200,000 marks (£10,000) towards erecting a patho-anatomical institution, to be attached to the Berlin Veterinary School.

Correspondence, etc.

KNEE DISEASE IN HORSES.

SIR,—In the year 1873 evidence was taken in the House of Lords respecting the deterioration of blood stock in England, and mention was made by a member of the veterinary profession, who was examined, that a disease called "Knee disease," more particularly affecting the "Wild Dayrell" breed, was again becoming prevalent, after not exhibiting itself for a number of years. Can you, or any of your readers, kindly inform me what this ailment was?

We have the "Wild Dayrell" blood here, and latterly I met with a case in one where the knee joints were much enlarged.

There was neither heat nor pain, but the animal could not be trained, owing to this defect, as lameness supervened upon a stiff gallop.

It died subsequently, and not having been present when the carcase was buried, I lost the opportunity of examining the parts.

A gentleman residing in Adelaide (William Filgate, Esq.) has also observed the same thing, and tells me the paper in which the evidence will be found is Parliamentary Blue Book, No. 325, of 1873, which I cannot obtain here. Yours truly, THOMAS CHALWIN, M.R.C.V.S.

Adelaide. *Government Veterinary Surgeon, South Australia.*

South Australia, *July 13th*, 1882.

[Will any of our readers who know something of the Wild Dayrell stock, oblige us by giving their experience of the defect alluded to?]

THE NEW BOARD OF EXAMINERS.

DEAR SIR,—I shall be much obliged if you will kindly afford a corner in the next number of the VETERINARY JOURNAL for a few remarks which may not be inopportune at the present moment. The present Council is not likely to be called upon to perform a duty of greater importance than in the approaching election of a new Board of Examiners; and considering that the several appointments will be for five years, it will not be amiss to look ahead, and to interchange any helpful thoughts on the subject which may occur. A general feeling in the profession prevails in favour of the examiners being selected in future from amongst ourselves, instead of our continuing to invite the co-operation of the medical profession in the matter; and should this course be acted on, it will be desirable, as it occurs to me, to testify to our own integral strength, whilst at the same time distributing to the full in our own ranks the honours at our disposal, by electing a full complement of examiners to constitute the Board, that each may fill a post in the several divisions, in preference to delegating to a less number a plurality of subjects. The diploma would thus certainly be enhanced in appreciation by the greater number of names attached to it. I should therefore propose to confine each class as much as possible to its own separate examiners.

Class C, the final examination, embraces matter of such importance to all concerned (to the profession, to the examiners, and to the candidates), that I must not hesitate in offering a suggestion in connection with it. It is intended that in future the *same* examiners shall officiate in the Pass examinations in England and in Scotland, and it is proposed to elect *only two* examiners to this office, *i.e.*, two for the subject of "Horses," and two for the subject of "Cattle." At the present time this examination is of a dual character, there being the practical examination, and the final oral examination, both of which must be passed by the candidate to enable him to obtain recognition of his merit in the event of his being successful in one only.

The inconvenience of this arrangement, and its hardship on the student, have been recognised, and accordingly, in a short time, the alteration will come into force, making these two examinations distinct and independent.

I would submit that it is undesirable to place the grave responsibility of these examinations on *two* examiners only, and as the result of my experience and no little thought on the subject, I consider it would be better to intrust it to *four* who should act in pairs, interchangeably and in rotation, thus, A and B, B and C, C and D, and so on.

The advantages of such a course would be the increased freshness and vigour imparted to the examinations; also, in the event of inability on the part of an examiner to attend on any given occasion, the Council would have the satisfaction of holding in reserve a ready substitute in an approved and duly elected member of the Board.

The College would not incur additional expense in thus augmenting the number of its representatives on the Board, but would, by so much, strengthen its efficiency.

Yours faithfully,
J. ROALFE COX.

Mount Street, London. *September 14th*, 1882.

DISEASE IN CHICKENS.

DEAR SIR,—Whilst attending a horse at Kinver Vicarage, a few days back, I noticed in the paddock a number of chickens, which appeared unwell. I obtained permission from the vicar's wife to make a *post-mortem* examination of one, and promised to send her particulars. They are as follows:—Nothing abnormal, except the lungs, which are filled with a yellow cheese-like material, a large amount of congestion, etc., existing. There are a large number of fowls (principally chickens) dying, about this part, with this affection. I am sorry that I must admit that I am ignorant as to the cause, etc.

Perhaps some of your readers may kindly give me some information. I will send the lungs, should you think it sufficiently interesting.

I am, faithfully yours,
ROBERT J. DAWSON.

Veterinary Infirmary, Market Street,
Stourbridge, *Sept. 13th.*

[If our correspondent will send a dead chicken to the Brown Institution, Wandsworth Road, London, S.W., a careful examination will be made of it.]

EPILEPSY AND MEGRIMS.

DEAR SIR,—A cart-horse, a few days back, was brought to our infirmary for advice, the owner informing me that the animal was subject to fits. He had owned him for four years, and it was only during the last week or two that he had noticed him to be subject to these attacks of "giddiness."

On examining him I noticed nothing unusual; the pupils were of a uniform size, and not larger than they should be. The collar was the same that he had worn for years.

I looked upon it as a case of Megrims, but as we so seldom, now-a-days, get animals affected with that malady, I thought I would send the particulars to THE VETERINARY JOURNAL.

I gave him ʒvi. dose of Barbadoes Aloes, a day or two to rest, and ʒj. Potass. Bromid. morning and night, and advised them to work him in a breast collar, and apply cold water to his head, continually, during the fits.

I see that the old veterinary writers look upon "Megrims" and Epilepsy as the same disease. I must admit that I do not know if the symptoms during life and the *post-mortem* appearances are the same in Epilepsy of *man* and "Megrims" of the horse.

I told the owner that the animal's offspring would probably be affected, if the fits continued.

I am, sir, faithfully yours,

EPSOM.

CORRECTION.

In the list of students who recently passed their first examination in Edinburgh, and which appeared in last month's JOURNAL, A. Isledhill should be A. Gledhill (New Veterinary College).

Communications, Books, Journals, etc., Received.

Communications have been received from T. Chalwin, South Australia; G. Gartside Mayor, Kirkham; A. C. Robertson, Worcester; J. W. T. Moore, Birkenhead; J. Roalfe Cox, London; R. J. Dawson, Stourbridge; "Epsom;" J. C. Berne, A.V.D., Cahir; R. Rutherford, Edinburgh; A. G. Rolls, Arundel; G. A. Banham, Cambridge; E. C. Hill, Glasgow; A. Gledhill, Halifax.

BOOKS AND PAMPHLETS: *G. Chenier*, Le Service Vétérinaire dans les Armees de l'Europe; Bulletin de la Soc. Roy. Protectrice des Animaux; *C. Siegen*, Bericht über die Pasteur'sche Impfung gegen Milzbrand in Herve; *J. J. Meyrick, Woolwich*, Stable Management and the Prevention of Disease among Horses in India; *G. Fleming*, Animal Plagues, their History, Nature, and Treatment (Vol. II.); *G. M. Humphry*, Vivisection, what Good has it Done; *J. Simon*, Experiments on Life; *W. Bowman*, Address in Surgery; 'S. Rijks Veeartsenijschool te Utrecht Programma.

JOURNALS, ETC.: *Journal de Médecine Vétérinaire; American Journal of Insanity; Echo Vétérinaire; Deutsche Zeitschrift fur Thiermedicin und Vergleichende Pathologie; Oesterreichische Vierteljahresschrift für Wissenschaftliche Thierheilkunde; Wochenschrift für Thierheilkunde und Viehzucht; Der Thierarzt; La Clinica Veterinaria; Recueil de Médecine Vétérinaire; Revue Vétérinaire; Archives Vétérinaire; La Presse Vétérinaire; American Veterinary Review; Annales de Médecine Vétérinaire; Live Stock Journal; Tidskrift jör Veterinär-Medicin; Lancet; British Medical Journal; Medical Press and Circular; Chicago Live Stock Journal; Edinburgh Medical Journal; Nature; Squire; Proceedings of the Medical Society of Kings; Breeders' Gazette; Australasian Veterinary Journal.*

NEWSPAPERS: *Norfolk Chronicle; Cambridge Independent Press; Nordwest; Picton Colonial Standard; West Cumberland Times; Glasgow Citizen; Freeman's Journal; Belfast Northern Whig.*